Public Draft

Environmental Assessment for the Proposed Construction, Operation, and Decommissioning of a Solar Photovoltaic System at Naval Air Station Lemoore, California

May 2015

Prepared for:
United States Department of the Navy

PUBLIC DRAFT

ENVIRONMENTAL ASSESSMENT FOR
THE PROPOSED CONSTRUCTION, OPERATION, AND DECOMMISSIONING OF A SOLAR PHOTOVOLTAIC SYSTEM AT NAVAL AIR STATION LEMOORE, CALIFORNIA

ABSTRACT

Lead Agency for the Environmental Assessment: Naval Air Station Lemoore

Title of Proposed Action: Proposed Construction, Operation, and Decommissioning of a Solar Photovoltaic System at Naval Air Station Lemoore, California

Affected Region: Kings and Fresno Counties, California

Designation: Environmental Assessment

The United States Department of the Navy (Navy) has prepared this Environmental Assessment (EA) in accordance with the National Environmental Policy Act of 1969 and other applicable laws. This EA analyzes the potential environmental impacts resulting from the construction, operation, and decommissioning of a solar photovoltaic (PV) system at Naval Air Station Lemoore, California.

Under the Proposed Action, the Navy and a private partner would enter into an agreement to allow the private partner to use Navy land to construct, operate, and own the proposed solar PV system. The partner would sell the generated power to regional customers and/or the Navy. The private partner would be responsible for maintenance, operation, and the eventual decommissioning of the solar PV system. The EA analyzes two action alternatives (Alternatives 1 and 2) and the No Action Alternative. This EA includes a detailed analysis of the Proposed Action's potential environmental effects on the following resources: land use, biological resources, public health and safety, socioeconomics, visual resources, cultural resources, air quality, utilities, and transportation.

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LIST OF ACRONYMS AND ABBREVIATIONS

AC	alternating current
APE	area of potential effects
APZ	Accident Potential Zone
BASH	Bird Aircraft Striking Hazard
BMP	best management practice
B.P.	Before Present
CA	California
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CAISO	California Independent System Operator
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CPUC	California Public Utilities Commission
CVP	Central Valley Project
CZ	Clear Zones
DC	direct current
DoD	Department of Defense
EA	Environmental Assessment
EDD	Employment Development Department
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
ESQD	Explosive Safety Quantity Distance
FAA	Federal Aviation Administration
FY	fiscal year
GHG	greenhouse gas
GW	gigawatt
HAP	hazardous air pollutants
INRMP	Integrated Natural Resources Management Plan
kV	kilovolt
LOS	Level of Service
MVA	megavolt ampere
MW	megawatt
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NAS	Naval Air Station
NAVFAC SW	Naval Facilities Engineering Command Southwest
Navy	U.S. Department of the Navy
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NO_x	oxides of nitrogen
NRHP	National Register of Historic Places
NRMA	Natural Resources Management Areas
NSR	New Source Review
O_3	ozone
PG&E	Pacific Gas & Electric
$PM_{2.5}$	fine particulate matter less than or equal to 2.5 microns in diameter
PM_{10}	suspended particulate matter less than or equal to 10 microns in diameter
ppm	parts per million
PV	photovoltaic
ROI	region of influence
RONA	Record of Non-Applicability
SDZ	Surface Danger Zone
SECNAV	Secretary of the Navy
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District
SO_2	sulfur dioxide
SR	State Route
U.S.	United States
USC	U.S. Code
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
$\mu g/m^3$	micrograms per cubic meter
WWD	Westlands Water District

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EXECUTIVE SUMMARY

The United States Department of the Navy (Navy) has prepared this Environmental Assessment (EA) in accordance with the National Environmental Policy Act of 1969 and other applicable laws. This EA presents an analysis of the potential environmental consequences of a Proposed Action pertaining to the construction, operation, and decommissioning of a solar photovoltaic (PV) system at Naval Air Station (NAS) Lemoore, California.

This EA will assist Navy officials in making a decision about whether or not to implement the Proposed Action through selection of one of the action alternatives. This document will also help determine whether significant impacts would occur as a result of implementation of the alternatives, and therefore, whether an Environmental Impact Statement is needed. The Navy has developed two action alternatives: Alternative 1: Construction, Operation, and Decommissioning of an up to 390 megawatt (MW) solar PV system at Sites A and B; and, Alternative 2: Construction, Operation, and Decommissioning of an up to 390 MW Solar PV System at Sites A, B, D, and/or E.

The purpose of the Proposed Action is to increase Navy installation energy security, operational capability, strategic flexibility and resource availability through the development of renewable energy generating assets at Navy installations by the construction and operation of a solar PV system at NAS Lemoore. The Proposed Action is required to meet the renewable energy standards put forth by the 1 Gigawatt (GW) Initiative and Secretary of the Navy (SECNAV) Energy Goals.

The screening factors used to develop the reasonable range of alternatives include the following: (1) must not interfere with installation mission activities and operations or create unsafe conditions; (2) should contribute to the SECNAV's goal of obtaining 1 GW of renewable energy by the end of 2020 by providing a sufficiently sized parcel (or parcels) of land for solar PV system placement; and, (3) should provide a location and/or design capable of providing electricity at or below the current cost of traditional power.

Under the Proposed Action, the Navy and a private partner would enter into an agreement to allow the private partner to use Navy land to construct, operate, and own the proposed solar PV system. The partner would sell the generated power to regional customers and/or the Navy. The private partner would be responsible for maintenance, operation, and the eventual decommissioning of the solar PV system.

Under Alternative 1, an up to 390 MW solar PV system would be constructed and operated at Sites A and B at NAS Lemoore. At the end of the agreement, the solar PV system would be decommissioned and the site returned to its pre-project condition. An Alternative 1 Option has also been identified and analyzed: construction and operation of a 20 MW solar PV system at Site A. Under the Alternative 1 Option, no construction would occur at Site B. Under Alternative 2, an up to 390 MW Solar PV system would be constructed and operated at Sites A, B, D, and/or E. At the end of the agreement, the solar PV system would be decommissioned and the site returned to its pre-project condition.

The following resources areas were evaluated for potential environmental consequences: land use, biological resources, public health and safety, socioeconomics, visual resources, cultural resources, air quality, utilities, and transportation. Table ES-1 summarizes the potential environmental consequences and avoidance/minimization measures associated with implementation of Alternative 1, Alternative 2, and the No Action Alternative. As shown in Table ES-1, no significant impacts to any resource area would occur with implementation of the alternatives; and some less than significant impacts would be further minimized or avoided with implementation of the identified avoidance/minimization measures.

Table ES-1. Summary and Potential Impacts and Avoidance/Minimization Measures

Resource Area	Alternative 1: 390 MW		Alternative 2: 390 MW (Sites A, B, D, and/or E)	No Action Alternative
	Sites A and B: 390 MW	Option 1, Site A Only: 20 MW		
Land Use				
Impact Summary	No Significant Impact. Temporary change in land use from agricultural to renewable energy. Consistent with the NAS Lemoore Master Plan. No impact to airfield height restrictions. Partial ESQD overlap of Site B. Temporary impact to farmlands of statewide importance; no long-term conversion would occur.	No Significant Impact. Potential impacts would be similar to those described for Sites A and B; however, no ESQD overlap of Site A would occur.	No Significant Impact. Temporary change in land use from agricultural to renewable energy. Consistent with the NAS Lemoore Master Plan. No impact to airfield height restrictions with Avoidance/Minimization Measure. Partial ESQD overlap of Site B. Temporary impact to farmlands of statewide importance; no long-term conversion would occur.	No Significant Impact. There would be no change in existing conditions; therefore, no impacts would occur.
Avoidance/ Minimization Measures	1. The private partner would prepare and submit construction site plans for review and approval by the DoD Explosive Safety Board for any portion of the project that would occur within an ESQD arc. 2. The private partner would prepare and submit a land evaluation and site assessment (to establish a farmland conversion impact rating score) to the Natural Resources Conservation Service. 3. The private partner would prepare a soil reclamation plan as part of decommissioning activities. The soil reclamation plan would outline the reclamation, restoration, and soil stabilization of the soils designated as farmland of statewide importance upon termination of the project.	Avoidance/Minimization Measures would be the same as measures 2 and 3 presented for Alternative 1, Sites A and B.	In addition to the Avoidance/ Minimization Measures presented for Alternative 1, Sites A and B, the following measure would be implemented under Alternative 2: 4. Transmission lines from Sites D and E would be constructed underground to avoid resulting in an incompatibility with APZ-1 and APZ-2.	No measures identified.

Resource Area	Alternative 1: 390 MW		Alternative 2: 390 MW (Sites A, B, D, and/or E)	No Action Alternative
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Biological				
Impact Summary	No Significant Impact. No impacts to federally listed species due to absence of listed species and suitable habitat. Should federally listed species become established or found to occur in the project area, Avoidance/Minimization Measures would be implemented to lessen impacts to levels of no significance. No population-level adverse effects to birds or bats as a result of mortalities related to "lake effect" of solar PV panels. Increase in habitat for foraging and/or ground-nesting wildlife species under solar PV panels. Sites A and B are located within the potential renewable energy area identified in the INRMP.	No Significant Impact. Potential impacts would be similar to those described for Sites A and B though at a smaller scale.	No Significant Impact. Potential impacts would be the same as those described for Sites A and B; however, Site E is immediately adjacent to NRMAs 4 and 5. There is a potential for wildlife, including special status species, to be impacted by construction and associated auditory and visual disturbances. The San Joaquin kangaroo rat was documented in NRMA 5 as recently as 2011, and habitat for the species currently occurs in the NRMA. As Site E is immediately adjacent to NRMA 5, the potential exists for San Joaquin kangaroo rat to use Site E for overland dispersal or movement. However, as there is no suitable habitat, a lack of burrows within Site E, and the species is primarily nocturnal, the species is not expected to be present during daytime construction activities. Sites D and E are not located within the potential renewable energy area identified in the INRMP.	No Significant Impact. There would be no change in existing conditions; therefore, no impacts would occur.
Avoidance/ Minimization Measures	1. All project activities would be in compliance with the MBTA and its general requirements related to nest impact avoidance guidelines. 2. To avoid impacts to ground-nesting birds, a survey for active nests or nesting activity would be conducted before construction and decommissioning should such activities occur during the nesting season (typically March 15 to August 31). If the survey finds active nests, then construction personnel would either avoid	Avoidance/Minimization Measures would be the same as presented for Alternative 1, Sites A and B.	In addition to the Avoidance/ Minimization Measures presented for Alternative 1, Sites A and B, the following measures would be implemented under Alternative 2, if Site E is selected: 18. Informal consultation with the USFWS would occur before implementation to ensure that mitigations for federally listed species are properly implemented.	No measures identified.

Resource Area	Alternative 1: 390 MW		Alternative 2: 390 MW (Sites A, B, D, and/or E)	No Action Alternative
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	the nests until fledglings have left, or permitted personnel would relocate eggs and chicks following all federal and state regulations and permitting requirements. 3. To the extent feasible, construction activities in or near suitable or occupied bird nesting habitat during the breeding season would be avoided (March 15 to August 31). 4. If construction activities occur during the nesting season for migratory birds, a qualified biologist would conduct preconstruction nesting bird surveys within 14 days before construction activities within a given work area. Tree-nesting raptors and ground-nesting birds would be surveyed for in the project area and adjacent windbreaks. The initial survey would be conducted at least 14 days before construction to allow sufficient time to develop an avoidance strategy if nests are identified. A final survey would be conducted within 24 hours of ground-disturbing activities. 5. If an active nest is identified near a given work area and work cannot be conducted outside the nesting season (March 15 to August 31), a no-activity zone would be established around the nest by a qualified biologist in coordination with the USFWS. Fencing and/or flagging would be used to delineate the no-activity zone. The no-activity zone would be large enough to avoid nest abandonment and would be between 50 and 1,000 feet from the nest, or as otherwise required by the USFWS.		19. If federally listed species are found during pre-construction surveys, they would be relocated using USFWS approved protocols and techniques, if necessary.	

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	6. NAS Lemoore and the private partner would implement the guidelines in the *Construction And On-Going Operational Requirements* section of the USFWS' *Standardized Recommendations for Protection of San Joaquin Kit Fox Prior to or During Ground Disturbance* (USFWS 2011 or current version). 7. A qualified biologist would conduct pre-construction surveys no less than 14 days and no more than 30 days before the commencement of construction/decommissioning activities to identify potential occupancy by special status species, including burrows or dens greater than 4 inches in diameter that could be used by San Joaquin kit fox. If during construction any burrows greater than 4 inches in diameter are found, they would be investigated to ensure the absence of San Joaquin kit fox. If any San Joaquin kit fox are found, construction would be stopped, and the Navy and wildlife agencies would be immediately notified. 8. NAS Lemoore and the private partner would notify USFWS in writing of the results of the pre-construction/decommissioning survey(s) within 30 days after these activities are completed. 9. If potential San Joaquin kit fox dens are located within the work area and cannot be avoided during construction/decommissioning activities, a USFWS-approved biologist would determine if the dens are occupied.			

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	10. If occupied San Joaquin kit fox dens are present within the work area, their disturbance and destruction would be avoided. Pre-construction exclusion zones would be implemented following the most current USFWS procedures (currently USFWS 2011). 11. Focused surveys for San Joaquin kangaroo rat would be conducted by a qualified biologist within 30 days before construction/decommissioning activities. The biologist would conduct burrow searches by systematically walking transects, which would be adjusted based on vegetation height and topography. If burrows suitable for use by San Joaquin kangaroo rat are found within 100 feet of the project area, focused live trapping surveys would be conducted by a qualified and permitted biologist following a methodology approved in advance by the USFWS. 12. If potentially suitable San Joaquin kangaroo rat habitat is discovered in the project area, a 50-foot no disturbance buffer would be implemented around small mammal burrows when live trapping is not conducted or when, in consultation with the USFWS, live trapping results are inconclusive in determining presence/absence for the species. 13. The developer would construct all transmission towers, poles, and lines in accordance with the guidelines in *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* (Avian Power Line Interaction Committee 2006), or the most current version of the guidelines available at the time of construction, and in			

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	Reducing Avian Collisions with Power Lines: The State of the Art in 2012 (Avian Power Line Interaction Committee 2012). 14. To avoid impacts to burrowing owls, surveys would be conducted before construction and decommissioning activities to assess use of the site(s) by the species. Should burrowing owls be present, they would be actively relocated by a qualified biologist. Relocation would include artificial burrow and perch construction preferably at a suitable location nearby but away from construction, either on-site or at a suitable off-site location. This would be done before breeding season or after fledging stage when the nest/burrows can be covered by weed free hay bales. 15. During construction and decommissioning, a qualified biologist would be on-site daily to monitor and record activities as they pertain to biological resources. Results would be reported on a monthly basis, unless a species of concern is found or suspected to be found, and then the species would be reported immediately. The results of the monitoring would be reported to the NAS Lemoore biologist. 16. During the operations phase, quarterly monitoring surveys and reporting would be conducted at all solar PV arrays by a qualified biologist (day and night surveys) to assess use of the areas by wildlife, vegetation changes, and potential bird/bat mortalities and/or injuries. Results of the surveys would be provided to USFWS and CDFW for comments and recommendations to minimize impacts			

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	from continuing operations. In addition, quarterly monitoring data would be shared and coordinated with wildlife hazard management operations already occurring at NAS Lemoore, including BASH surveys, wildlife determent, and wildlife relocation/removal from areas in and around the NAS Lemoore Airfield (Lang 2012). 17. If federally listed species are observed in the project area following construction activities and/or during operation of the solar PV system, NAS Lemoore would be immediately notified. The Navy would assess whether ongoing operations might affect any such species and engage in consultation with the USFWS to discuss current and future management strategies, as appropriate.			
Public Health and Safety				
Impact Summary	No Significant Impact. Operation of the solar PV panels would not result in an increased flight safety risk, except glare from the northernmost panels at Site B could affect Runway 14L operations in the afternoon. Due to the lack of airspace penetration, reflectivity, and non-interference with communications from Sites A and B, and no evidence that solar PV arrays would increase bird activity, there would be no significant impacts on flight safety during construction or operation of the solar PV system. No increase in BASH potential. Construction and decommissioning activities would be conducted in compliance with health and safety regulations and would not pose a risk to construction personnel. No impact to workers from SDZs.	No Significant Impact. Potential impacts would be similar to those described for Sites A and B, though at a smaller scale. In addition, with the elimination of Site B, the potential effect to afternoon operations at Runway 14L would not occur.	No Significant Impact. Potential impacts would be the same as those described for Sites A and B; however, with solar PV panels facing south for optimum sun exposure, there is potential for glare from fixed solar PV arrays in almost half of Site D and all of Site E to affect the control tower.	No Significant Impact. There would be no change in existing conditions; therefore, no impacts would occur.

Resource Area	Alternative 1: 390 MW		Alternative 2: 390 MW (Sites A, B, D, and/or E)	No Action Alternative
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Avoidance/ Minimization Measures	1. Construction activities that have a potential to generate substantial amounts of dust (e.g., initial site grading) would be first coordinated and scheduled with NAS Lemoore Operations to avoid potential impacts to aviation training. 2. If the currently inactive skeet ranges are activated, work within the SDZ overlap of Site B would only occur when the skeet ranges are closed.	Avoidance/Minimization Measures would be the same as measure 1 presented for Alternative 1, Sites A and B.	In addition to the Avoidance/ Minimization Measures presented for Alternative 1, Sites A and B, the following measures would be implemented under Alternative 2: 3. A tracking solar PV system (single-axis) would be needed to reduce glare from the solar PV panels at Sites D and E towards the control tower. 4. Rifle range activities would be deconflicted with worker access within the SDZ overlap of Site E.	No measures identified.
Socioeconomics				
Impact Summary	<u>No Significant Impact.</u> Loss in agricultural lease income of approximately $318,500 annually; loss of revenue could potentially be completely offset by the lease fee to be paid by the private partner to the Navy. Loss of an estimated $5,947,000 in annual crop value from the local economies of Kings and Fresno counties; or, a loss of 0.13 percent of the annual market value for crops in Kings and Fresno counties. Elimination of approximately 24 agricultural jobs. Construction would create approximately 300 temporary construction jobs. Temporary decrease in demand for irrigation water.	<u>No Significant Impact.</u> Potential impacts would be similar to those described for Sites A and B, though at a smaller scale. Specifically, a reduction in annual lease revenues by approximately $37,200. Estimated annual loss in annual crop value totals $695,400, or approximately 0.01 percent of the total combined annual crop value of Kings and Fresno counties. Loss of approximately 3 agriculture jobs; however, creation of approximately 100 temporary construction jobs.	<u>No Significant Impact.</u> Potential impacts would be the same as those described for Sites A and B.	<u>No Significant Impact.</u> There would be no change in existing conditions; therefore, no impacts would occur.
Avoidance/ Minimization Measures	No measures identified.	No measures identified.	No measures identified.	No measures identified.

Resource Area	Alternative 1: 390 MW		Alternative 2: 390 MW (Sites A, B, D, and/or E)	No Action Alternative
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Visual				
Impact Summary	No Significant Impact. Construction impacts would be temporary and limited to viewers from adjacent roadways and agriculture parcels. The solar PV system would be compatible with NAS Lemoore's visual character. The approximately fifty-five, 80-foot (24-meter) tall steel poles for the new 230-kV transmission line would be visible to persons in the Administrative/Housing Area but would be consistent with the existing visual environment.	No Significant Impact. Potential impacts would be similar to those described for Sites A and B, though at a smaller scale. In addition, under Model 2 and the combination of Models 2 and 3, the 69-kV transmission line poles would be shorter (approximately 58 feet tall. Under Model 3, no transmission line/poles would be constructed.	No Significant Impact. Potential impacts would be similar as those described for Sites A and B; however, if Sites D and/or E are selected, segments of the transmission lines from these sites would be underground, thus having no visual impact when underground. Other segments of the 230-kV transmission line would be above ground and visible.	No Significant Impact. There would be no change in existing conditions; therefore, no impacts would occur.
Avoidance/ Minimization Measures	No measures identified.	No measures identified.	No measures identified.	No measures identified.
Cultural				
Impact Summary	No Significant Impact. The three archaeological sites within the APE are either ineligible for listing on the NRHP (therefore not a historic property) or would be avoided during construction, operation, and decommissioning activities. The Navy has requested the SHPO concur with a finding of "No Historic Properties Affected" finding.	No Significant Impact. The two archaeological sites within the APE would be avoided during construction, operation, and decommissioning activities. The Navy has requested the SHPO concur with a finding of "No Historic Properties Affected" finding.	No Significant Impact. The three archaeological sites within the APE are either ineligible for listing on the NRHP (therefore not a historic property) or would be avoided during construction, operation, and decommissioning activities. No recorded cultural resources are present within Sites D and E. The Navy has requested the SHPO concur with a finding of "No Historic Properties Affected" finding.	No Significant Impact. There would be no change in existing conditions; therefore, no impacts would occur.

Resource Area	Alternative 1: 390 MW		Alternative 2: 390 MW (Sites A, B, D, and/or E)	No Action Alternative
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Avoidance/ Minimization Measures	1. In the event of a discovery during any excavation, the contractor would be required to immediately stop work in the area of the discovery and immediately notify the Navy of the discovery. The Navy would have the discovery site evaluated by a professional archeologist, and in consultation with the SHPO. If the discovery is determined to qualify for listing on the NRHP, the Navy would develop and implement an appropriate treatment plan before authorizing the excavation or construction responsible for the discovery to proceed.	Avoidance/Minimization Measures would be the same as presented for Alternative 1, Sites A and B.	Avoidance/Minimization Measures would be the same as presented for Alternative 1, Sites A and B.	No measures identified.
Air Quality				
Impact Summary	No Significant Impact. Minor and temporary increase in emissions generated as a result of construction, operational maintenance, and decommissioning. Operationally, fewer GHG and particulate matter emissions due to the switch to renewable energy. Reduction in dust generation associated with the ending of agriculture operations. Emissions would not exceed *de minimis* thresholds. Hazardous air pollutant emissions would be negligible.	No Significant Impact. Potential impacts would be similar to those described for Sites A and B, though at a smaller scale.	No Significant Impact. Potential impacts would be similar as those described for Sites A and B; however, if Sites D and/or E are selected, segments of the transmission lines from these sites would be underground, thus resulting in more construction and ground disturbance and greater project emissions.	No Significant Impact. There would be no change in existing conditions; therefore, no impacts would occur.
Avoidance/ Minimization Measures	1. Proper and routine maintenance of all vehicles and other construction equipment would be implemented to ensure that emissions are within design standards. 2. Dust suppression methods (such as using water trucks to wet the construction/decommissioning area during construction, and the application of a soil stabilizer during operation) would minimize fugitive dust emissions. 3. Construction equipment with combustive engines would meet USEPA Tier 4 emission standards, as practicable to do so.	Avoidance/Minimization Measures would be the same as presented for Alternative 1, Sites A and B.	Avoidance/Minimization Measures would be the same as presented for Alternative 1, Sites A and B.	No measures identified.

Resource Area	Alternative 1: 390 MW		Alternative 2: 390 MW (Sites A, B, D, and/or E)	No Action Alternative
	Sites A and B: 390 MW	**Option 1, Site A Only: 20 MW**		
Utilities				
Impact Summary	No Significant Impact. Potential for temporary and localized power disruption when the solar PV system comes on-line. Would support achievement of Navy's renewable energy goals and strategies. Under the Model 2 and combination of Models 2 and 3, there would be an increase in regional power supply. Under Model 3, a local renewable energy source would be created for NAS Lemoore. Existing and/or new electrical infrastructure would be sufficient to support the solar PV system.	No Significant Impact. Potential impacts would be similar to those described for Sites A and B, though at a smaller scale.	No Significant Impact. Potential impacts would be the same as those described for Sites A and B.	No Significant Impact. There would be no change in existing conditions; therefore, no impacts would occur.
Avoidance/ Minimization Measures	No measures identified.	No measures identified.	No measures identified.	No measures identified.
Transportation				
Impact Summary	No Significant Impact. Temporary increase in traffic associated with construction (740 daily vehicle trips), operations and maintenance, and decommissioning activities (150 daily vehicle trips). Some of the trips associated with these activities (i.e., delivery of construction materials and equipment; the removal of construction debris; and operations and maintenance) would be periodic, and would not regularly add traffic to the roadway network. Moreover, because the construction areas are outside of fenced areas on the installation, traffic would not contribute toward any delays or queues at the Reeves Gate, the Avenal Gate, or the Operations Side Main Gate.	No Significant Impact. Potential impacts would be the same as those described for Sites A and B, though at a smaller scale (less daily vehicle trips).	No Significant Impact. Potential impacts would be the same as those described for Sites A and B.	No Significant Impact. There would be no change in existing conditions; therefore, no impacts would occur.

Resource Area	Alternative 1: 390 MW		Alternative 2: 390 MW (Sites A, B, D, and/or E)	No Action Alternative
	Sites A and B: 390 MW	Option 1, Site A Only: 20 MW		
Avoidance/ Minimization Measures	1. Worker and equipment/materials delivery vehicles would avoid use of any of the gates providing access to the fenced areas of the installation (i.e., the Operations Side and the Administrative Side/Family Housing Area) and the NAS Lemoore Main Gate, especially during peak commuting periods (typically between 7:00 and 9:00 a.m. and 4:30 to 6:30 p.m.).	Avoidance/Minimization Measures would be the same as presented for Alternative 1, Sites A and B.	Avoidance/Minimization Measures would be the same as presented for Alternative 1, Sites A and B.	No measures identified.

Notes: APE = area of potential effects; APZ = Accident Potential Zone; BASH = Bird Aircraft Striking Hazard; CDFW = California Department of Fish and Wildlife; ESQD = Explosive Safety Quantity Distance; GHG = Greenhouse Gas; INRMP = Integrated Natural Resources Management Plan; kV = kilovolt; MBTA = Migratory Bird Treaty Act; NRHP = National Register of Historic Places; NRMA = Natural Resources Management Areas; SDZ = Surface Danger Zones; SHPO = State Historic Preservation Officer; USFWS = U.S. Fish and Wildlife Service.

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THE PROPOSED CONSTRUCTION, OPERATION, AND DECOMMISSIONING OF A SOLAR PHOTOVOLTAIC SYSTEM AT NAVAL AIR STATION LEMOORE, CALIFORNIA

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CHAPTER 1
PURPOSE OF AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION/BACKGROUND

The United States (U.S.) Department of the Navy (Navy) has prepared this Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) of 1969 and other applicable laws. This EA analyzes the potential environmental impacts resulting from the construction, operation, and decommissioning of a proposed solar photovoltaic (PV) system at Naval Air Station (NAS) Lemoore, California (CA). This proposed project is one of several renewable energy projects the Navy is currently evaluating within the Renewable Energy Program Office Southwest area of responsibility. NAS Lemoore is the action proponent for this proposed project.

1.1.1 SECRETARY OF THE NAVY RENEWABLE ENERGY GOALS AND STRATEGIES

1.1.1.1 Goals

In October 2009, the Secretary of the Navy (SECNAV) established renewable energy goals for the Navy's shore-based installations to meet by 2020. These goals include:

1. The Navy will produce or procure at least 50 percent of the total quantity of electric energy consumed by shore-based facilities and activities each fiscal year (FY) from alternative energy sources.
2. Fifty percent of Navy installations will be net zero (i.e., over the course of a FY, an installation matches or exceeds the electrical energy it consumes ashore with electrical energy generated from alternative energy sources) (Navy 2012).

1.1.1.2 Strategies

The Navy's energy strategy is centered on energy security, energy efficiency, and sustainability while remaining the pre-eminent maritime power:

> Energy efficiency increases mission effectiveness. Efficiency improvements minimize operational risks while saving time and money.
>
> Energy security is critical to mission success. Energy security safeguards energy infrastructure and shields the Navy from a volatile energy supply.
>
> Sustainable energy efforts protect mission capabilities. Investment in environmentally responsible technologies afloat and ashore reduces greenhouse gas (GHG) emissions and lessens dependence on fossil fuels (Navy 2014a).

The SECNAV has established a goal for the Navy to develop one gigawatt (GW) of renewable energy generation capacity by the year 2020 (Navy 2012). The Navy has developed acquisition strategies based on the following three separate models (Figure 1-1) to procure or generate renewable energy to meet SECNAV goals:

Model 1: Off-base generation for on-base consumption:

- Navy purchases new renewable energy generation for on-base load
- Renewable energy generation provides price stability and diversifies energy portfolio
- Acquisition: Inter-agency Agreement

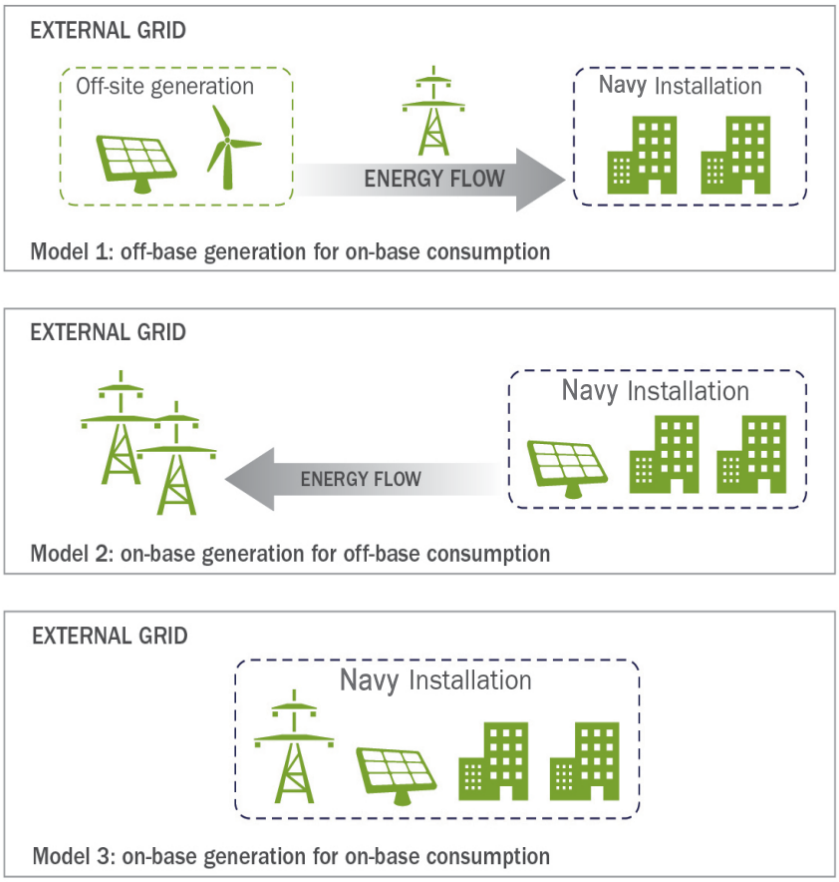

Figure 1-1. Renewable Energy Models

Model 2: On-base generation for off-base consumption:

- Third party produces on Navy property and exports energy to grid (allows for much higher capacity of production vs Model 3)
- Navy to receive energy security via lease terms
- Acquisition: Real estate outgrant

Model 3: On-base generation for on-base consumption:

- Navy consumes all energy generated
- Price stability and diversifies energy portfolio
- Acquisition: Power Purchase Agreement

The Navy proposes to implement Model 2, Model 3, or a combination of Models 2 and 3 at NAS Lemoore to support achievement of the SECNAV's goals. Under Model 2, the Navy and a private partner would enter into a 37-year agreement to allow the private partner to use Navy land to construct, operate, and own the solar PV system. Once the systems are operational, the private partner would sell the power to regional customers. The private partner would be responsible for maintenance, operation, and the eventual decommissioning of the solar PV system. Under Model 3, the Navy and a private partner would enter into a 27-year agreement to allow the private partner to use Navy land to generate power for the Navy's use at NAS Lemoore. Under a combination of Models 2 and 3, the private partner would sell the power to regional customers and NAS Lemoore.

1.1.2 SOLAR PV SYSTEMS

A solar PV system consists of all components needed to generate and transmit solar-generated power. This includes solar PV arrays, transmission lines, and supporting infrastructure such as switching stations.

Solar PV technology uses solar cells to convert energy from direct and diffuse solar radiation into electricity. The basic unit in a solar PV system is a solar cell made up of semiconductor material that absorbs solar radiation and converts solar radiation to an electrical current. Solar cells are contained within solar modules that are assembled into solar panels. A series of panels comprises a solar field, or as termed in this EA, an array. Solar PV arrays generate direct current (DC) electricity, which is converted to alternating current (AC) for transmission on the electrical grid and ultimate end-use in AC form. The conversion from DC to AC occurs at a power conditioning station that contains inverters. Transmission lines and substations then transfer the power to the nearest utility grid point of connection.

Solar PV arrays are comprised of hundreds and sometimes thousands of individual solar PV panels. The vast majority of the solar PV market uses Flat Plate PV technology. In this design, the manufacturer arranges the cells on a flat panel, sandwiches the cells between a transparent encapsulant and a thin backing sheet of polymer, and then tops the cells with a layer of tempered glass that allows light to reach the PV cells. An anti-reflective coating covers this top layer so more light can be absorbed by each cell (U.S. Department of Energy 2011). Each panel can be stationary (fixed axis), or track the sun with either single-axis or multi-axis tracking equipment. Photo 1 provides an image of an example solar PV array at Marine Corps Air Ground Combat Center, CA. This example solar PV array, covering approximately 6.5 acres (2.6 hectares), consists of fixed axis panels that generate approximately 1.1 megawatt (MW) of power. Photo 2 presents an example solar PV array where the panels have a single-axis.

Photo 1. Fixed-Axis Solar PV Array

Photo 2. Typical Single-Axis Solar PV Array

Solar PV energy projects generally require 10 acres (4 hectares) to produce 1 MW of power; however, due to relatively high solar radiation values and favorable climate at NAS Lemoore, this EA assumes that this proposed project would require approximately 7 acres (2.8 hectares) to generate 1 MW[1] of power.

[1] The unit of MW is not a quantity, but a rate. The electricity is produced at a rate measured in MWs, but the quantity of power produced is measured as a rate multiplied by a time period, usually in hour increments. For example, a 25 MW system could generate power at a rate of 25 MW for 8 hours and thus produce 200 MW hours of power. In our homes, we use/buy power in kilowatt hours (noted as kwh on our power bills) and power companies produce and transmit electricity in terms of MW hours.

1.2 PROJECT LOCATION

1.2.1 HISTORY AND MISSION OF NAS LEMOORE

NAS Lemoore is located in the central portion of the San Joaquin Valley, in Kings County and Fresno County, CA (Figure 1-2). Situated between the Sierra Nevada Mountains on the east and the California Coast Range on the west, NAS Lemoore is at an elevation of 240 feet (73 meters) above mean sea level.

Established in 1961, NAS Lemoore (Figure 1-3) remains the Navy's newest, largest, and only west coast Master Jet Base. NAS Lemoore's principal mission is to support Strike Fighter Wing, U.S. Pacific Fleet and its mission to man, train, and equip west coast Strike Fighter squadrons (NAS Lemoore 2014a). While the electrical load (demand) at NAS Lemoore fluctuates due to seasonal and operational changes, the peak historical annual demand was just under 20 MW.

1.2.2 POTENTIAL SOLAR PV SITES

The Navy has determined that up to approximately 5,700 acres (2,306 hectares) at NAS Lemoore can potentially serve as areas for solar PV systems. The proposed project area consists of the four potential solar PV sites (Sites A, B, D, and E) and supporting transmission infrastructure consisting of existing and proposed elements (Table 1-1 and Figure 1-4). As depicted on Figure 1-4, there are two transmission sites currently located within Site B; these areas (covering approximately 73 acres [30 hectares]) are used to support aircraft communications and are thus excluded from the proposed project area.

Based on the potential power generated by acre as presented in Section 1.1.2, *Solar PV Systems*, Table 1-1 presents the approximate maximum MW power production capability for each site. The four potential sites (A, B, D, and E) being considered for the project are currently leased by the Navy for agriculture.

Table 1-1. Potential Solar PV Development Sites and Generating Potential

Site	Potential Solar PV Site (acres [hectares])	Potential Generating Potential[1] (MW)
A	366 (148)	52
B	2,764 (1,118)	395
D	1,808 (732)	258
E	790 (320)	113

Note: [1] Assumes 7 acres (2.8 hectares) are needed to generate one MW of power.

1.3 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The purpose of the Proposed Action is to increase Navy installation energy security, operational capability, strategic flexibility and resource availability through the development of renewable energy generating assets at Navy installations by the construction and operation of a solar PV system at NAS Lemoore. The Proposed Action is required to meet the renewable energy standards put forth by the 1 GW Initiative and the SECNAV Energy Goals.

The policy requirements for energy security and increased production of energy from alternative sources by 2020 are addressed in part by including, in any potential agreement (or real estate outgrant) entered into by the Navy and a private partner, a requirement that project infrastructure be 'micro-grid-ready,' meaning that the Navy would have the option to use any energy produced "on-base" in the event of an area power outage or other circumstances.

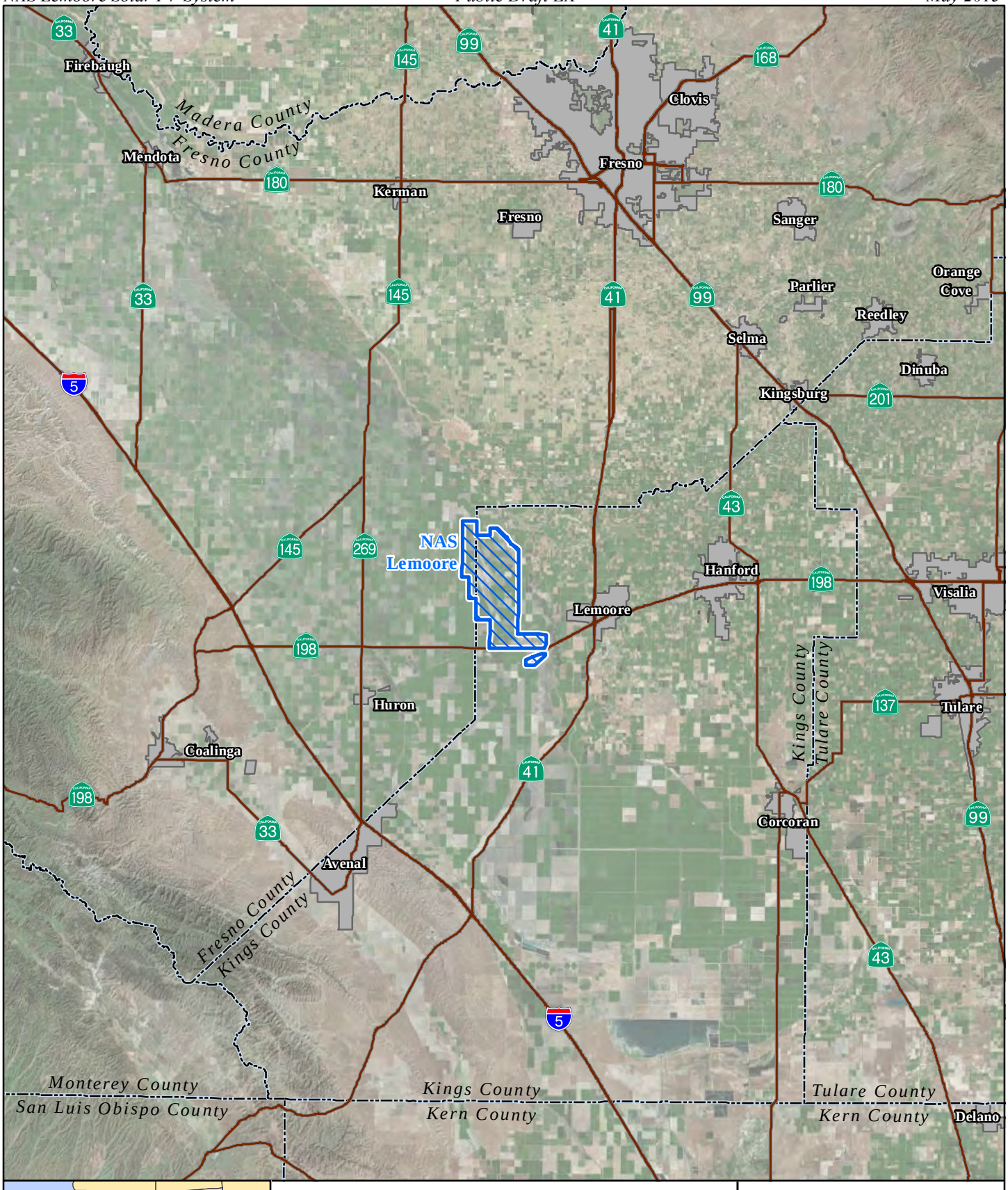

Figure 1-2
Regional Location
of NAS Lemoore

Figure 1-3
NAS Lemoore

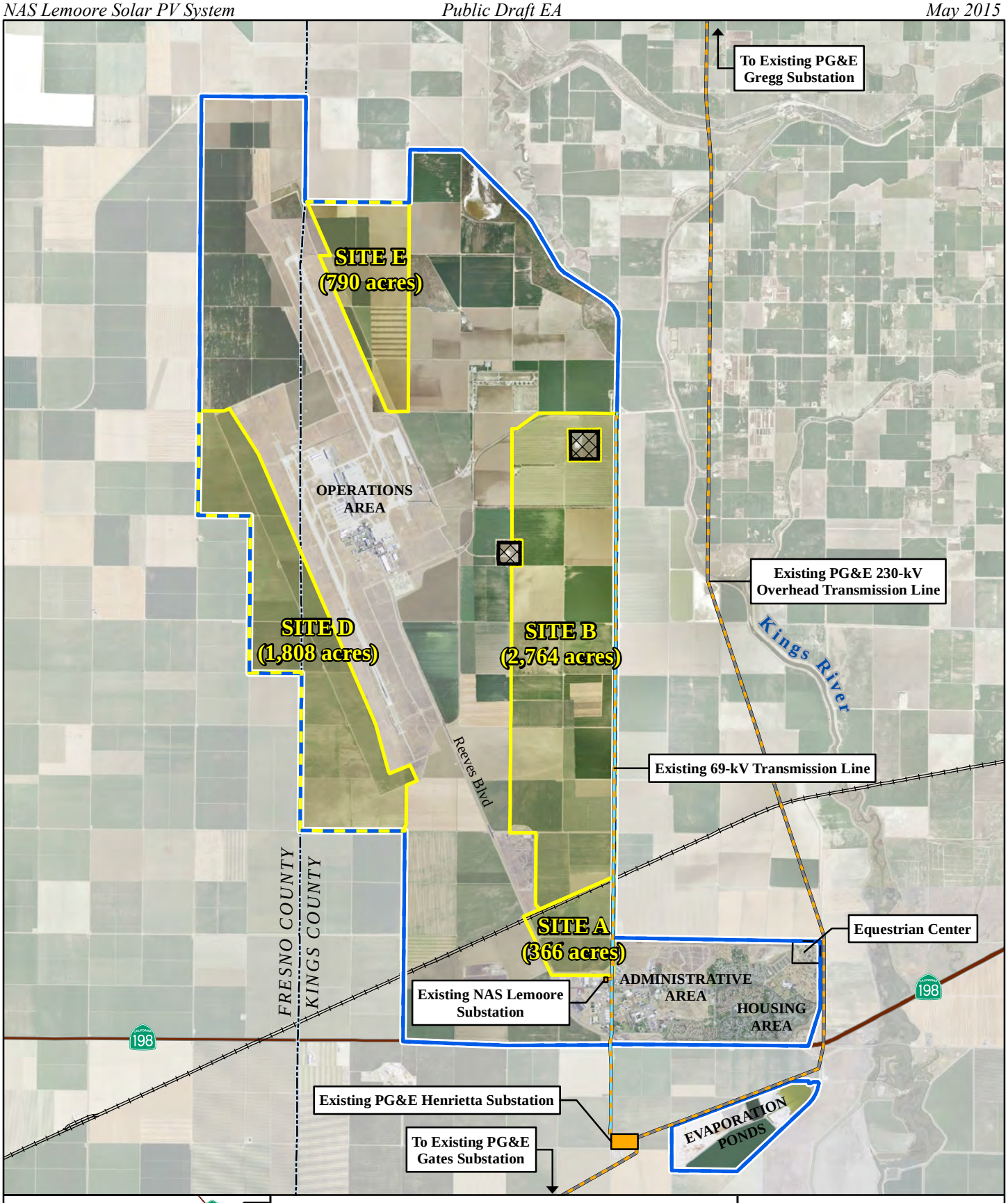

Figure 1-4
Existing Conditions and Potential Solar PV System Sites at NAS Lemoore

1.4 DECISION TO BE MADE

The decision to be made as a result of the analysis in this EA is to determine if an Environmental Impact Statement (EIS) needs to be prepared. An EIS will need to be prepared if it is determined that the alternative ultimately selected for implementation would have significant impacts to the human or natural environment. Should an EIS be deemed unnecessary based on the analysis of environmental impacts for the alternative selected for implementation, this selection would be documented in a Finding of No Significant Impact.

1.5 SCOPE OF ANALYSIS

1.5.1 PREVIOUS STUDY

A Feasibility Study was prepared (Naval Facilities Engineering Command Southwest [NAVFAC SW] 2015a) to examine and validate the results of a 2010 study (Western Area Power Administration 2010). The 2010 study considered the construction and operation of a 100-250 MW solar PV system at NAS Lemoore.

In addition to validating the 2010 study, the 2015 Feasibility Study included an evaluation of the existing utility transmission system and its current capacity to determine probable points of interconnection locations, size, and condition in association with the evaluated technologies. This EA has integrated the results of the 2015 Feasibility Study, notably in the development and characterization of alternatives.

1.5.2 RESOURCE AREAS

1.5.2.1 Resources Analyzed in Detail

As described and evaluated in Chapter 3, this EA analyzes the following resource areas in detail:

- Land Use
- Biological Resources
- Public Health and Safety
- Socioeconomics
- Visual Resources
- Cultural Resources
- Air Quality
- Utilities
- Transportation

1.5.2.2 Resources Not Analyzed in Detail

Several other resource areas typically assessed in environmental documents were considered but not carried forward for detailed analysis in this EA. This is because any potential impacts to these resource areas from the action alternatives would be either non-existent or considered negligible at most. The reasons for not analyzing the following resources in detail are presented below.

Geological Resources. The geological characteristics of the potential solar PV system sites consist of regularly disturbed agriculture soils with very little relief. No unique topographic features exist in this highly disturbed environment. Implementation of the action alternatives would temporarily disturb soils within the project area, resulting in an increased potential for dust generation and erosion. However, these potential effects would be temporary, minor, and would be controlled through the implementation of the

environmental protection measures presented in Table 3.0-1, *Summary of Environmental Consequences and Avoidance/Minimization Measures*. A spray-on erosion control fiber matrix (soil stabilizer) would be applied to the soil following construction, which would reduce the potential for soil erosion and dust. Unlike the No Action Alternative, the soil would not be subject to frequent tilling, disturbance, or the application of fertilizers and pesticides. Section 3.1, *Land Use*, considers potential impacts to prime farmland. As the alternatives do not include the construction of regularly occupied structures, there would be no potential seismic-related safety concerns. Therefore, impacts to geological resources from implementation of the alternatives would be negligible.

Water Resources. Surface water features within the project area consist of agricultural irrigation ditches between Sites A and B; two ditches that bisect Site B; several ditches that are adjacent to Site D; and an agricultural ditch that bisects Site E. No wetlands are located within the project area. Implementation of the alternatives would not alter existing surface water features but would require compliance with the General Permit for Discharges of Stormwater Associated with Construction Activity (Construction General Permit Order 2009-0009-DWQ) because construction would include grading of more than 1 acre (0.4 hectare). An Erosion Control Plan would be prepared to include standard erosion control measures (e.g., silt fencing) to reduce potential impacts (e.g., soil loss and sedimentation) to water resources during construction. Section 3.4, *Socioeconomics*, considers potential impacts to water rights/irrigation. Section 3.8, *Utilities*, considers potential impacts to water supply and use. No use or impact to groundwater would occur from the construction or operation of the solar PV system. Implementation of the alternatives would have a minimal positive effect on water quality due to a reduction in agricultural-related runoff. Therefore, impacts to water resources from implementation of the alternatives would be negligible.

Hazardous Materials and Wastes. The Proposed Action would avoid any existing Installation Restoration sites located within or adjacent to the project area. Small leaks or spills may potentially occur from vehicles and equipment used during the proposed construction, operation, and decommissioning of the solar PV system. To manage any accidental releases, all solar PV-related activities would be conducted in accordance with the NAS Lemoore Spill Prevention Control and Countermeasures Plan (NAS Lemoore 2000). Hazardous materials and wastes used and/or generated as part of the Proposed Action would be handled and disposed of in accordance with the NAS Lemoore Hazardous Waste Management Plan (NAS Lemoore 2007) and all applicable federal, military, state, and local laws and regulations. Therefore, impacts to hazardous materials and wastes from implementation of the alternatives would be negligible.

Noise. The potential solar PV system sites are all located within a currently noisy area due to the proximity of aircraft operations. Specifically, all potential solar PV system sites and transmission line corridors are located within the 70-decibel Community Noise Equivalent Level contour (Navy 2014b). Construction and decommissioning noise associated with the solar PV system arrays at Site A would occur over half a mile from the closest NAS Lemoore residential housing. The east-west segment of the proposed transmission line located to the north of NAS Lemoore residential housing would be located approximately 300 feet (91 meters) away (at the closest extent) from the housing area. Construction activities in this area would consist of tower pad grading, excavation, assembling and lifting towers into place, and stringing the lines. This combined activity would generate average instantaneous peak noise levels of approximately 89 decibels (A-weighted) at a distance of 50 feet (15 meters). Construction noise would decrease exponentially with increasing distance; thus, at a distance of 300 feet (91 meters), average construction noise would be less than 75 decibels (A-weighted), similar to a "noisy urban area during the day" (80 decibels [A-weighted]) (California Department of Transportation [Caltrans] 2013a). Construction noise would be temporary, transitory, and limited to regular working hours. Under certain atmospheric conditions (i.e., during periods of high humidity), the operation of the transmission lines may

generate sizzles, crackles, or hissing noises (caused by the ionization of electricity in the moist air near the wires). Though this noise would be audible very close to the transmission lines, the noise would quickly dissipate with increasing distance and would be masked by background noises. The proposed switching station in the equestrian center would be located over 1,600 feet (488 meters) from existing housing; thus, construction noise would be consistent with background noise levels at the housing areas. Therefore, impacts to the noise environment from implementation of the alternatives would be negligible.

Environmental Justice. Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires federal agencies to consider human health and environmental conditions in minority and low-income communities. NAS Lemoore is located in a primarily agricultural region populated by census-defined minority and low-income populations. The nearest population center is Lemoore, CA. Based on best-available census data, the minority population of Lemoore is less than 50 percent, and the population is considered impoverished (U.S. Census Bureau 2010). As presented in Section 3.4, *Socioeconomics*, the Proposed Action would result in a reduction of approximately 24 agriculture jobs; jobs that are traditionally held by minority and/or low-income populations. The reduction in agriculture jobs would be negligible when compared to the regional agriculture employment sector. Therefore, there would be no disproportionally high environmental or health impacts on low-income or minority populations from implementation of the alternatives.

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, helps ensure that federal agencies' policies, programs, activities, and standards address environmental health and safety risks to children. The proposed solar PV system would be constructed on government property, where access is controlled. If a 230-kilovolt (kV) transmission line and switching station are constructed, the construction of these features would be adjacent to the perimeter of the NAS Lemoore Housing Area. Standard job site safety measures would be implemented, which include securing equipment, materials, and vehicles, as well as neutralizing potential safety hazards during construction. In addition, the solar PV arrays and supporting sub/switching stations would be fenced to minimize the potential for unauthorized access. Therefore, there would be no disproportionate impact to the health and safety of children from implementation of the alternatives.

1.6 INTERGOVERNMENTAL COORDINATION

1.6.1 AGENCY CONSULTATIONS

Table 1-2 presents the anticipated agency permits and consultation potentially needed for the Proposed Action. As shown in the table, approval from the California Public Utilities Commission[2] (CPUC) and the California Independent System Operator[3] (CAISO) would be required only if Model 2 were to be implemented. Of note, while approval from the CPUC and CAISO is not a requirement for this EA, ultimately (i.e., after completion of the NEPA process), the private partner would obtain the approvals from these entities for implementation of Model 2. Appendix A contains relevant agency correspondence.

[2] The CPUC regulates investor-owned utilities in California, oversees the procurement of renewable energy in the state under the Renewable Portfolio Standard implementation program, and permits electrical transmission.

[3] The CAISO is an independent, non-profit organization that oversees the operation of California's electric power system, transmission lines, and electricity market. Proposed connections from private power producers to investor-owned utilities are subject to the review and approval of the CAISO.

Table 1-2. Anticipated Permits and Consultation for the Proposed Action

Agency	Permit or Approval	Current Status
USFWS	Section 7 of the ESA	It is anticipated that the Navy will consult with the USFWS
California SHPO	Section 106 of the NHPA	The Navy has initiated consultation with the SHPO and Tribal Governments
CPUC[1]	Public Utilities Code Section 399.11	The private partner will obtain a power purchase agreement from the CPUC
CAISO[1]	Public Utilities Code Sections 2811-2816	The private partner will obtain an Interconnection Agreement from the CAISO

Notes: [1] Approval would be required from CPUC and CAISO only if Model 2 were to be implemented.
CAISO = California Independent System Operator; CPUC = California Public Utilities Commission; ESA = Endangered Species Act; SHPO = State Historic Preservation Officer; NHPA = National Historic Preservation Act; USFWS = U.S. Fish and Wildlife Service.

1.6.2 SUMMARY OF RELEVANT RENEWABLE ENERGY POLICIES

The following provides a summary of federal requirements relevant to the Proposed Action.

1.6.2.1 EO 13693, *Planning for Federal Sustainability in the Next Decade*

EO 13693 (dated March 19, 2015) superseded EO 13423 (*Strengthening Federal Environment, Energy, and Transportation Management*) and EO 13514 (*Energy Efficient Standby Power Devices*). The goal of EO 13693 is to maintain federal leadership in sustainability and GHG emission reductions. EO 13693 establishes policies to maintain federal leadership in sustainability and GHG emission reductions. As relevant to this EA, EO 13693 identifies requirements relating to energy conservation, efficiency, and management; minimum percentages of total building energy obtained from clean energy sources; and, improvements in water use efficiency and management, including stormwater management.

1.6.2.2 Secretary of the Navy Energy Goals

On October 14, 2009, the SECNAV established five aggressive renewable energy goals for the Navy's shore-based installations to meet by 2020. The goals pertain to improved fuel use in aircrafts as well as energy reduction and production. The goal that pertains the most to this document is: The Navy will produce at least 50 percent of shore-based energy requirements from alternative sources.

1.6.2.3 1 Gigawatt Initiative

In support of the SECNAV Energy goals, October 1, 2012, Secretary Mabus chartered the 1 GW Task Force to enable the Navy to procure one GW of renewable energy generation capacity by 2020. 1 GW of renewable energy generation directly addresses several of the mandates and goals for which the Navy is accountable: EO 13693 (this EO superseded EOs 13423 and 13514), the 10 U.S. Code (USC) § 2911 "25 by 25" mandate (25 percent by 2025), Energy Policy Act 2005 graduated renewable energy targets, and the SECNAV's departmental goals.

To reach the 50 percent renewable energy generation goal (which the 1 GW goal directly supports) in a cost-effective fashion, the Navy must purchase or facilitate the production of significant quantities of renewable energy while reducing power consumed through energy efficiencies. The overall Navy energy strategy, therefore, includes both lines of effort: deploy renewable energy in support of the 1 GW goal and simultaneously bring the 50 percent renewable energy generation goal closer by reducing overall energy consumption.

1.7 PUBLIC/AGENCY PARTICIPATION

This section will be updated following completion of the Draft EA 30-day public review period. Based on the current schedule, the Draft EA public review period will run from May 22, 2015 to June 22, 2015. No public meeting will occur.

CHAPTER 2
PROPOSED ACTION AND ALTERNATIVES

Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of the NEPA establish a number of policies for federal agencies, including "using the NEPA process to identify and assess the reasonable alternatives to the Proposed Action that will avoid or minimize adverse effects of these actions on the quality of the human environment" (40 Code of Federal Regulations [CFR] 1500.2 [e]). This EA only carries forward for detailed analysis those alternatives that could meet the purpose of and need for the project as defined in Section 1.3, *Purpose of and Need for the Proposed Action* and the below-listed reasonable alternative screening factors.

2.1 REASONABLE ALTERNATIVE SCREENING FACTORS

The screening factors used to develop the reasonable range of alternatives are as follows:

1. Must not interfere with installation mission activities and operations or create unsafe conditions.
2. Should contribute to the SECNAV's goal of obtaining 1 GW of renewable energy by the end of 2020 by providing a sufficiently sized parcel (or parcels) of land for solar PV system placement.
3. Should provide a location and/or design capable of providing electricity at or below the current cost of traditional power (e.g., orientation/location/slope relative to the sun for generating higher amounts of power, or a lower system cost relative to output).

2.2 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.2.1 PROPOSED ACTION

Under the Proposed Action, the Navy and a private partner would enter into an agreement to allow the private partner to use Navy land to construct, operate, and own the proposed solar PV system. The partner would sell the generated power to regional customers and/or the Navy. The private partner would be responsible for maintenance, operation, and the eventual decommissioning of the solar PV system. The construction and use of energy storage batteries at NAS Lemoore is not part of the Proposed Action.

The Navy has identified two action alternatives (Alternatives 1 and 2) as meeting the reasonable screening factors. The following sections provide descriptions of these two alternatives. In addition, Section 2.2.4 compares each of the action alternatives and Section 2.2.5 describes the No Action Alternative.

2.2.2 ALTERNATIVE 1: CONSTRUCTION, OPERATION, AND DECOMMISSIONING OF AN UP TO 390 MW SOLAR PV SYSTEM AT SITES A AND B

Sites A and B cover approximately 3,130 acres (1,266 hectares). Under Alternative 1, up to approximately 2,730 acres (1,104 hectares) within Sites A and B would be developed to support the construction and operation of an up to 390 MW solar PV system at NAS Lemoore (Figure 2-1). At the conclusion of the agreement (either 37 years [Model 2] or 27 years [Model 3]), the solar PV system would be decommissioned and the site returned to its pre-project condition. An Alternative 1 Option (Section 2.2.2.2) has also been identified: construction, operation, and eventual decommissioning of a 20 MW solar PV system at Site A only. Under the Alternative 1 Option, no construction would occur at Site B.

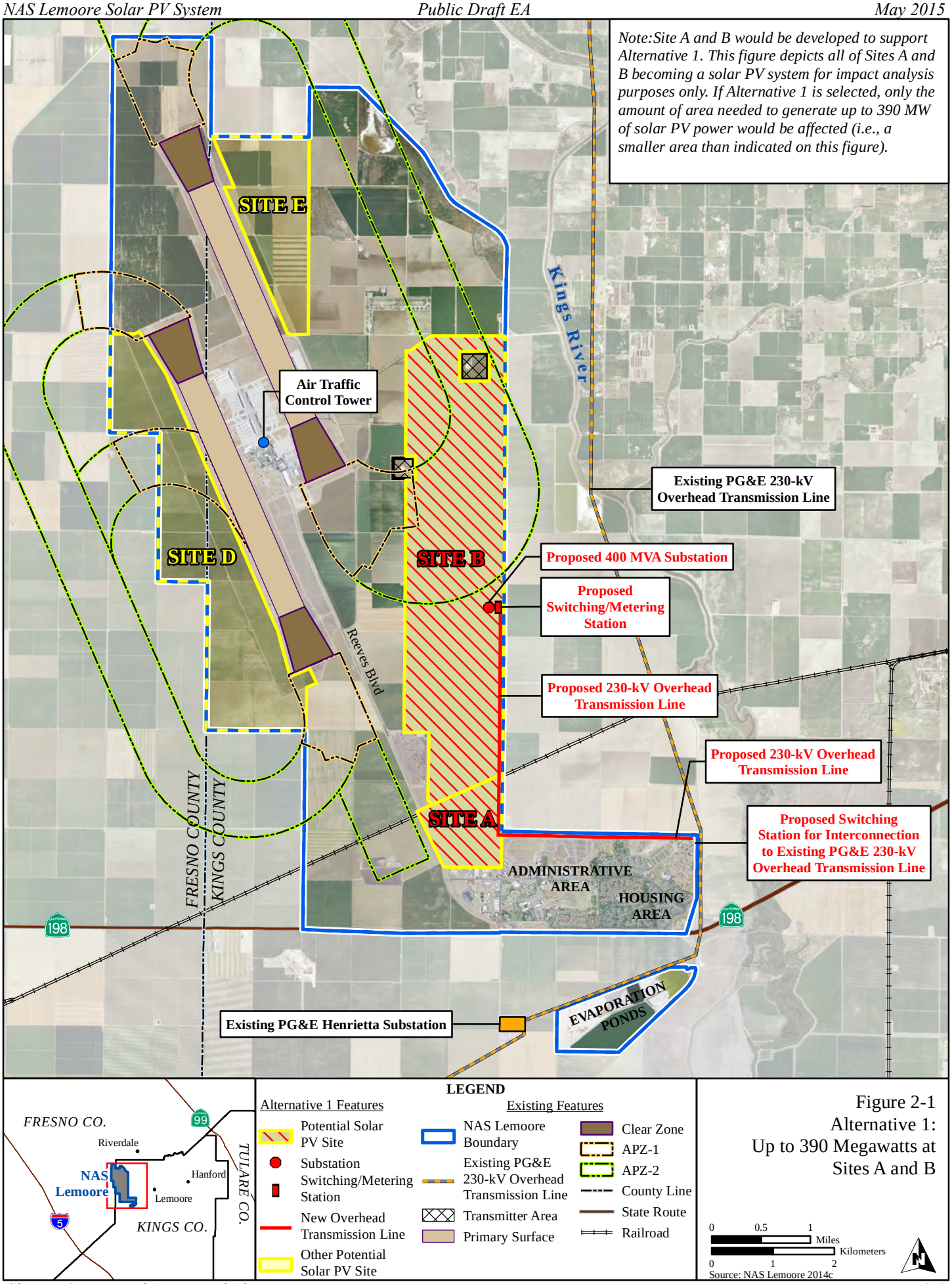

Figure 2-1
Alternative 1:
Up to 390 Megawatts at
Sites A and B

2.2.2.1 Acquisition Strategies and Future Considerations

Under Alternative 1, a solar PV system would be developed to generate renewable energy at NAS Lemoore under either a Model 2, Model 3, or combination of Models 2 and 3 (see Section 1.1.2). Under a Model 2 acquisition strategy, the Navy and private partner would enter into a lease agreement (or real estate outgrant) to allow the partner to use Navy land to construct, operate, and own the solar PV system. While Navy land would be used, no existing Navy infrastructure (transmission lines, substation, etc.) would be used by the partner under the Model 2 acquisition strategy. The Navy would receive compensation for the lease, but would not directly receive the power generated by the solar PV system. The partner would sell the generated power to regional customers outside the Navy. The partner would be responsible for all maintenance and service of the system; no federal tax dollars would be used for maintenance/service. The approximate contract duration would be 37 years. The 37-year agreement would consist of 2 years for construction[4], followed by an initial 25-year operating term and two, 5-year operating extensions (10 years). This acquisition strategy maximizes the total capacity (size) of the system based on available land, and not NAS Lemoore's electrical demand.

Under a Model 3 acquisition strategy, the Navy would enter into a lease agreement (or real estate outgrant) plus a Power Purchase Agreement, for a private partner to construct, operate, and own a solar PV system on NAS Lemoore. Once the solar PV system is operational, the Navy would purchase and use all of the electricity generated from the solar PV system. The partner would be responsible for all maintenance and service of the system; no federal tax dollars would be used for maintenance/service. The approximate contract duration would be 27 years. The 27-year agreement would consist of 2 years for construction[5], followed by an initial 20-year operating term and one, 5-year operating extension. This acquisition strategy limits the total capacity (size) of the system based on NAS Lemoore's electrical demand, and not the total amount of land available.

Under both the Model 2 and Model 3 strategies, the land impact, function of the facility, conservation and construction measures would be nearly identical. The only notable difference would be the extent of construction and routing of electrical distribution lines (i.e., point of connection from solar system to internal base grid) to either serve the public grid, or NAS Lemoore grid. Under the combination of Models 2 and 3, some power generated would be used by the Navy and some by outside regional customers. The partner would be responsible for all maintenance and service of the system; no federal tax dollars would be used for maintenance/service. At the conclusion of the agreement, the partner would decommission the solar PV system and return the site to pre-project conditions.

In support of the Secretary of the Navy's energy goals, the Navy would utilize a real estate action (lease) to ensure fair compensation for the use of DON lands where renewable energy generation would occur at NAS Lemoore. The real estate action facilitates on-base generation of renewable energy for on and off-base consumption via a third-party developer. In accordance with 10 USC §2667, the leases would provide for consideration (rent) to be paid in an amount not less than the fair market value of the leasehold interest, either in cash or in kind.

In keeping with authority of 10 USC §2667, outgrants (leases) under Model 2 shall provide for consideration (rent) to be paid, either in cash or in-kind, in an amount not less than the fair market value

[4] Depending on the ultimate size of the solar PV system chosen, construction may occur in up to two phases, with each phase lasting two years, for a total maximum construction duration of four years.

[5] Depending on the ultimate size of the solar PV system chosen, construction may occur in up to two phases, with each phase lasting two years, for a total maximum construction duration of four years.

of the lease. Potential projects provided by lessee to apply towards rents as in-kind consideration would meet necessary environmental regulations and requirements under separate reporting.

Although the Proposed Action addresses the known impacts of the federal lease action, details regarding the specific method of consideration to be employed, to include the design, construction, management and maintenance of any potential in-kind consideration projects or efforts, have not been developed at this time. Therefore, the Proposed Action may be subject to further site-specific planning, environmental planning, and engineering analysis as necessary.

2.2.2.2 Sites A and B

Construction

Following execution of the agreement with the private partner and termination of the existing agriculture lease(s), an up to 390 MW ground-mounted solar PV system would be constructed on NAS Lemoore at Sites A and B (Figure 2-1). Collectively, Sites A and B cover approximately 3,130 acres (1,266 hectares) and are relatively flat and outside of the growing season, generally devoid of vegetation. The construction area would be graded and any remaining vegetation would be cleared.

To support an up to 390 MW solar PV system, construction of the solar PV array would occur over approximately 2,730 acres (1,104 hectares) (assuming 7 acres [2.8 hectares] needed per one MW) within Sites A and B. Site preparation activities would include trenching (up to 3 feet [1 meter] deep per Unified Facilities Criteria codes) for underground electrical lines and circuitry. This analysis assumed that construction of an up to 390 MW system would occur in two phases and each phase would last approximately 2 years. Thus, the total construction period for a 390 MW solar system would be approximately 4 years. Construction of a smaller solar PV system at Sites A and B would take less time.

The 390 MW solar PV system would consist of solar PV panels, steel tracking structure, inverters, combiner boxes, electrical switchgear, a substation, a switching/metering station, transmission lines, and associated electrical wiring, connections, and other items required for the solar PV system. All electrical equipment, including inverters and transformers would be placed on concrete pads and all solar PV panel wiring would be routed underground. Gravel roads would be graded between the rows of solar PV panels and around the site perimeter (outside of the fence line) for maintenance access. No access improvements would be required as part of Alternative 1 because the existing road network adjacent to the project area is sufficient. A chain link fence with barbed-wire outriggers in accordance with force protection standards, including safety signage, would enclose the solar PV array to minimize the potential for unauthorized individuals to enter the area. As shown on Figure 2-1, the areas associated with the two existing transmitter areas (which provide communications support to aircraft operations) would be avoided; no construction in these areas would occur.

The solar PV panels would either be fixed or one-axis type panels. The panels would be constructed in east to west oriented rows to maximize solar radiation absorption. In contrast, the one-axis panels would include a drive shaft and motor that rotates the panels to follow the maximum solar irradiance throughout the day (i.e., the panels would track the movement of the sun). An electric drive motor mounted on the concrete foundation would rotate the panels.

The solar PV panels would be affixed atop constructed mounting structures, mounted on posts bored into the ground, or be placed on concrete block above ground (see Photos 1 and 2). Foundations for the mounting structures would be built on engineered fill or native soil at a minimum of 24 inches (61 centimeters) below adjacent grade or finished grade. Each pole footing would consist of a 4-inch (10-centimeter) cross-sectional area and would require a depth of 4 to 6.5 feet (1.2 to 2 meters) below ground

surface. Upon completion, the highest point of the solar PV array would be no higher than approximately 15 feet (5 meters) above the ground surface. The solar PV panels would have an anti-reflective coating that would improve light absorption and reduce or eliminate the potential for glint and glare[6] impacts.

The solar PV panels would be constructed elsewhere (in a factory). Solar PV panel assembly could occur either on- or off-site, or a combination thereof. A construction staging area would be delineated within the overall project area and all work would be done on-site. Materials would be transported to the project area by truck where they would be staged, assembled, and moved into place. Equipment used to construct the solar PV system would likely include bulldozers, loaders, scrapers, backhoes, pile drivers, water trucks, trenchers, forklifts, and truck-mounted mobile cranes. A spray-on erosion control fiber matrix (soil stabilizer) would be applied to the soil following construction, thus reducing the potential for soil erosion.

Within Site A or B, an up to 400 megavolt ampere (MVA) substation would also be constructed (see Figure 2-1). The substation would cover approximately 1.8 acres (0.7 hectare) and would serve as the interface connection of the solar PV array to the existing Pacific Gas & Electric (PG&E) 230-kV transmission line. A 230-kV switching/metering station would also be constructed. The switching/metering station would cover approximately 8,100 square feet (750 square meters) and would meter the solar PV power generated from Sites A and B. Finally, a switching station covering approximately 0.5 acre (0.2 hectare) would be constructed adjacent to the existing equestrian center to transfer electrical power generated from Sites A and B to the existing PG&E 230-kV transmission line (see Figure 2-1). A graveled buffer area would be developed around the switching station and a fence would be constructed to restrict access to the site.

Construction would create a minimal amount of construction debris that would be removed and disposed of in compliance with the Navy's Sustainability and Environmental Management Policy Statement (dated September 16, 2009) and sustainability goals (e.g., recycling approximately 50 percent of municipal trash and 40 percent of construction and demolition waste). All construction would be done in compliance with all Navy regulations applicable to conducting work activities on NAS Lemoore, and adherence with the environmental protection measures described in Table 3.0-1.

Operation and Maintenance

The existing 69-kV transmission line would not have capacity for the electricity generated at Sites A and B; therefore, a new 230-kV transmission line would be constructed from Sites A and B to the existing PG&E 230-kV transmission line (see Figure 2-1). To support the new 230-kV transmission line, approximately fifty-five, 80-foot (24-meter) tall steel poles would be constructed along the proposed route. Power would be delivered via the existing PG&E 230-kV transmission lines to the PG&E Henrietta substation. Under Model 2, the power would be delivered via existing infrastructure to regional customers. Under Model 3, the power would be used at NAS Lemoore. Under the combination of Models 2 and 3, the power would be used by regional customers and NAS Lemoore.

Post-construction site operations would include, but would not be limited to, use of existing access roads; electrical and mechanical systems; and maintenance and repair. Quarterly inspections of the solar PV system would be performed to ensure that the infrastructure is in good operating condition. The partner or their designated contractor would do any repairs or regular service. Typical maintenance of the solar PV panels would consist of washing down the panels approximately twice a year to remove dust and dirt build-up. One or two persons using a single water truck would perform this cleaning.

[6] Glint is the momentary flash of bright light. Glare is a continuous source of bright light.

Ground cover and other vegetation beneath and near the panels would be trimmed periodically and could be controlled with herbicides to ensure that vegetation does not obscure or shadow the panels. Any herbicide use would be in accordance with applicable federal, state, and local regulations, as well as manufacturer's guidelines. The access roads would be maintained as needed. All operations and maintenance would be done in compliance with all Navy regulations applicable to conducting work activities on NAS Lemoore, and with adherence to the environmental protection measures presented in Table 3.0-1.

Decommissioning

At the conclusion of the agreement, the partner would be required to decommission the solar PV system and all associated features and return the project area to its pre-project condition. A decommissioning plan would be prepared in accordance with Navy requirements. The plan would ensure that the project facilities would be decommissioned and removed and that Sites A and B would be restored to pre-construction conditions. Soils and impacted areas would be reclaimed to a level that would, at a minimum, support uses for the land consistent with pre-construction activities. The decommissioning and restoration process would likely involve the removal of aboveground structures, restoration of topsoil, revegetation, and seeding. Temporary erosion and sedimentation control best management practices (BMPs) would be used during the decommissioning phase of the project.

Decommissioning activities would use a mix of equipment and vehicles, likely to include bulldozers, scrapers, backhoes, water trucks, and truck-mounted mobile cranes. The decommissioning activities would likely occur over a period of approximately 2 months. Debris would be removed and disposed of in compliance with the Navy's Sustainability and Environmental Management Policy Statement (dated September 16, 2009) and sustainability goals (e.g., recycling approximately 50 percent of municipal trash and 40 percent of construction and demolition waste), or any new documentation that might replace the Navy's 2009 statement in the future.

All hazardous materials would be disposed of in accordance with applicable regulations at an appropriately accredited facility for the hazardous material(s). A decommissioning staging area would be delineated within the overall project area and all work would be done on-site. Following decommissioning activities, the Navy would certify that the land condition was returned to its pre-project condition. All decommissioning activities would be done in compliance with all Navy regulations applicable to conducting work activities on NAS Lemoore, and with adherence to the environmental protection measures presented in Table 3.0-1.

2.2.2.3 Alternative 1 Option: Construction, Operation, and Decommissioning of a 20 MW Solar PV System at Site A

Overview

Under the Alternative 1 Option, up to approximately 145 acres (59 hectares) at Site A would be developed to support the construction and operation of a 20 MW solar PV array and associated infrastructure (Figure 2-2a). Under the Alternative 1 Option, construction, operation, and decommissioning of the 20 MW solar PV system at Site A would be as generally described in Section 2.2.2.1; however, construction would be at a smaller scale and the transmission system would be different. The construction duration would also be approximately 2 years.

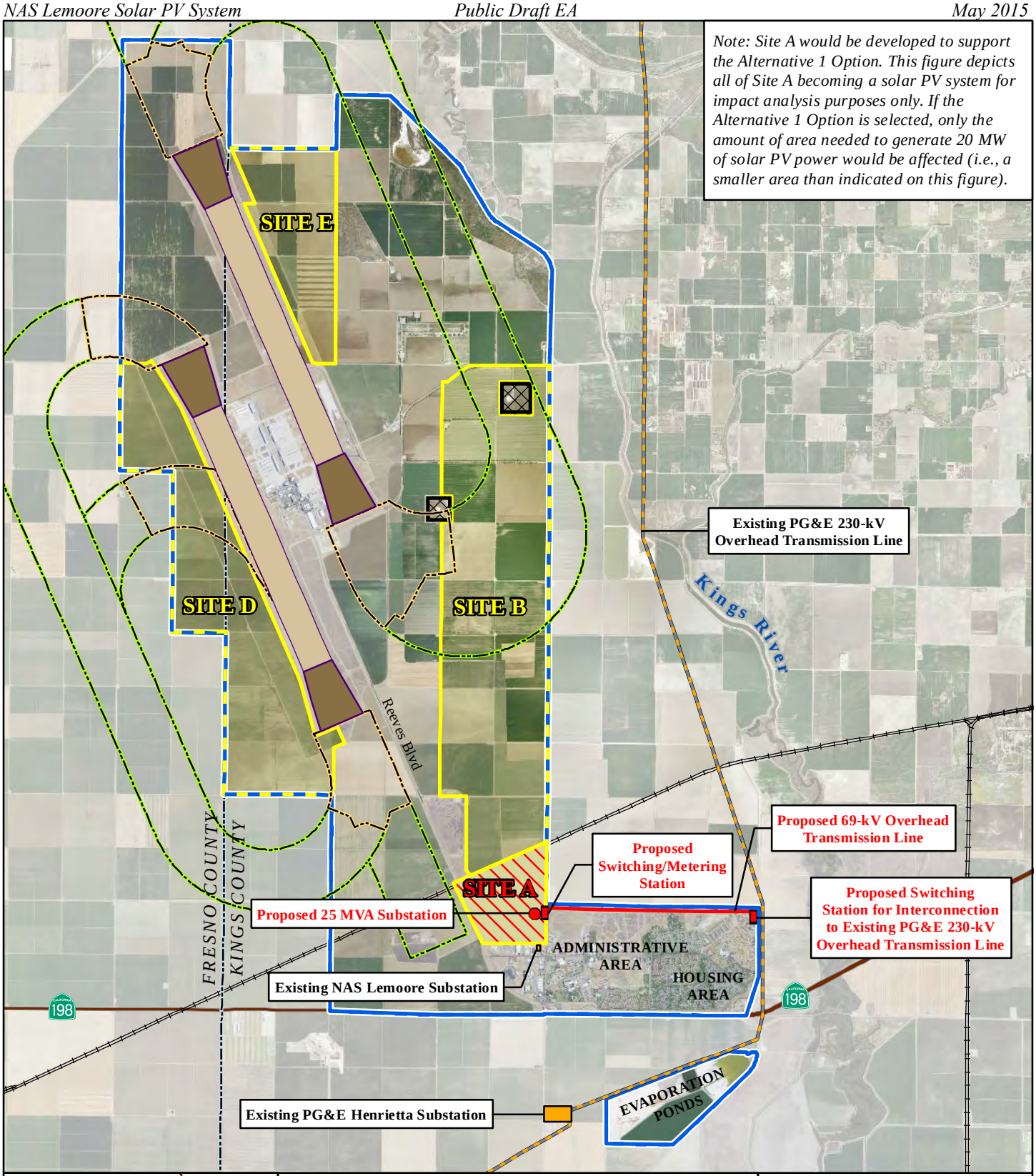

Figure 2-2a
Alternative 1 Option:
20 Megawatts at Site A with
New Transmission Line

Within Site A, a 25 MVA substation would be constructed (see Figure 2-2a). The substation would cover approximately 450 square feet (42 square meters) and would serve as the interface connection of the solar PV array to the existing 69-kV transmission line. A 69-kV switching/metering station would also be constructed within Site A (see Figure 2-2a). The switching/metering station would cover approximately 10,000 square feet (930 square meters) and would meter the power generated from Site A.

Transmission Line Routes

Under the Alternative 1 Option, for the Model 2 and combination of Models 2 and 3, the existing NAS Lemoore 69-kV transmission line would not be used (see Figure 2-2a). Instead, a new 69-kV transmission line would be constructed by the private partner in the same location and manner as described for Alternative 1 (i.e., from the new Site A 25 MVA substation to the existing PG&E 230-kV transmission line, via a new switching station located in the equestrian center area). Under the Model 2 or combination of Models 2 and 3, the power, then, would be used by regional customers alone, or in combination with NAS Lemoore.

Conversely, under the Alternative 1 Option for Model 3 renewable energy scenario, the transmission line leaving the solar PV array at Site A would connect to the existing NAS Lemoore 69-kV transmission line/power distribution system via the existing 69-kV transmission line located adjacent to the eastern boundary of Site A (Figure 2-2b). Power would be delivered via the existing 69-kV transmission line to the NAS Lemoore substation or the existing PG&E Henrietta substation for NAS Lemoore's exclusive use (Figure 2-2b).

2.2.3 Alternative 2: Construction, Operation, and Decommissioning of an up to 390 MW Solar PV System at Sites A, B, D, and/or E

Collectively Sites A, B, D, and E cover approximately 5,728 acres (2,318 hectares). Under Alternative 2, up to approximately 2,730 acres (1,104 hectares) within Sites A, B, D, and/or E would be developed to support the construction and operation of an up to 390 MW solar PV system at NAS Lemoore (Figure 2-3). Alternative 2 offers a greater amount of potential area to build up to a 390 MW solar PV system, as compared to Alternative 1. Under Alternative 2, the construction, operation, and decommissioning of the up to 390 MW solar PV system at Sites A, B, D, and/or E would be as described in Section 2.2.2.1; however, there would be a difference in transmission line type from Sites D and E.

As Alternative 2 would develop up to 390 MW of solar PV power (the same as Alternative 1), the approximate extent of surface impact (approximately 2,730 acres [1,104 hectares]) would be the same as Alternative 1; however, the location of the impact would be different (potentially up to four sites for Alternative 2 as opposed to two sites for Alternative 1).

As shown on Figure 2-3, if Sites D and/or E are developed, the west-east segment of the 230-kV transmission line would be underground to avoid encroachment on the existing flight easement. The flight easement does not allow vertical structures above 25-feet (8-meters) tall. Upon clearing the easement, the transmission line would run above ground along the eastern boundary of Sites A and B, then east to tie into the existing PG&E 230-kV transmission line. To support the new 230-kV transmission line, approximately one hundred, 80-foot (24-meter) tall steel poles would be constructed along the proposed route.

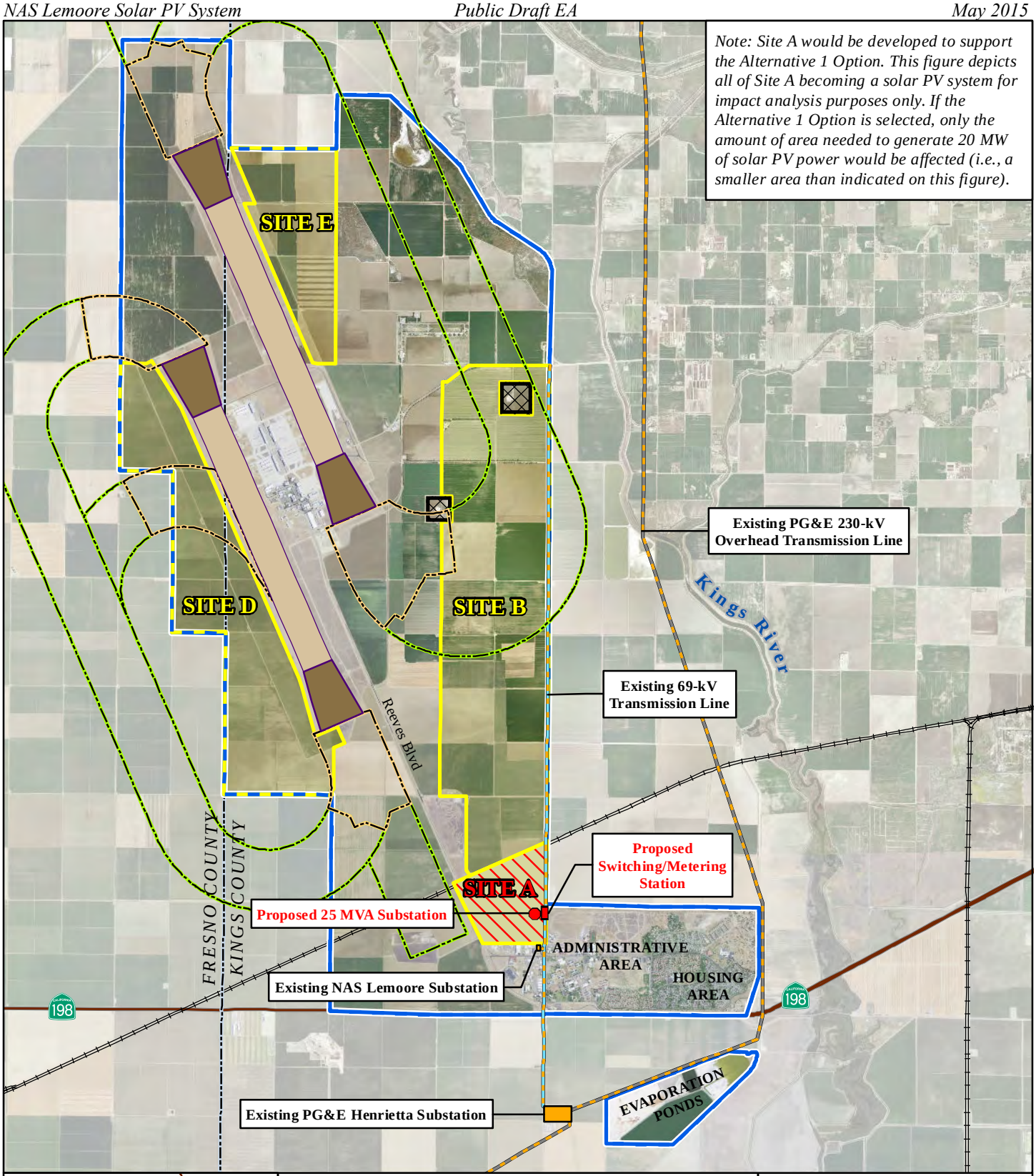

Figure 2-2b
Alternative 1 Option: 20 Megawatts at Site A using Existing 69-kV Transmission Line

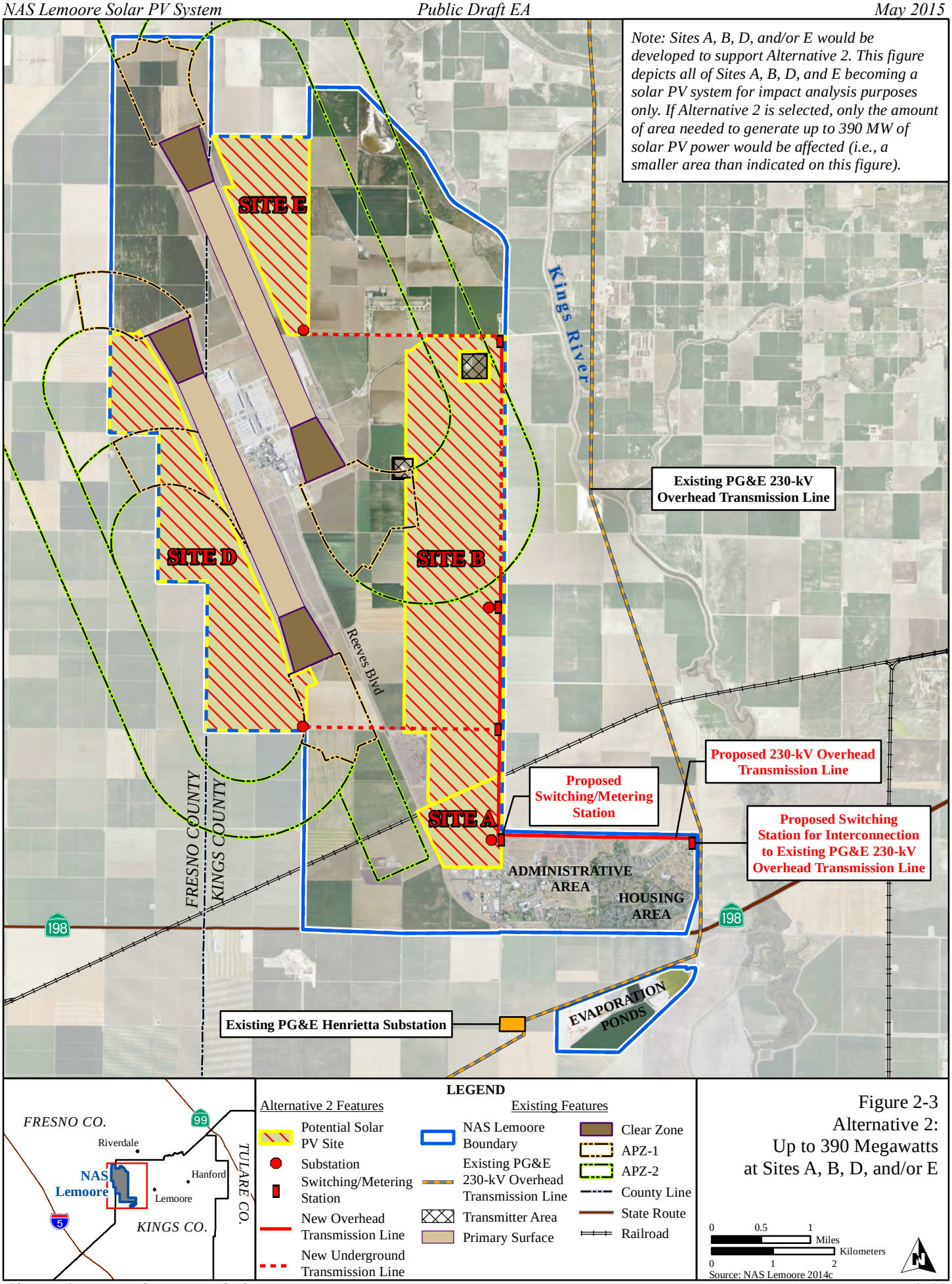

Figure 2-3
Alternative 2:
Up to 390 Megawatts
at Sites A, B, D, and/or E

2.2.4 COMPARISON OF ACTION ALTERNATIVES

Table 2-1 summarizes and compares the features associated with the action alternatives.

Table 2-1. Summary and Comparison of Action Alternatives

Alternative	System Size	Site(s)	Maximum Available Area	Transmission Line Type	Power User
Alternative 1 *(see Figure 2-1)*					
Model 2	Up to a 390 MW solar PV system[1]	A and B	3,130 acres	New 230-kV	Regional
Models 2 and 3					Regional and NAS Lemoore
Model 3					NAS Lemoore
Alternative 1 Option (*see Figures 2-2a and 2-2b)*					
Model 2	20 MW solar PV system	A	145 acres	New 69-kV (*Figure 2-2a*)	Regional
Models 2 and 3				New 69-kV (*Figure 2-2a*)	Regional and NAS Lemoore
Model 3				Existing 69-kV (*Figure 2-2b*)	NAS Lemoore
Alternative 2 *(see Figure 2-3)*					
Model 2	Up to 390 MW solar PV system[1]	A, B, D, and/or E	5,728 acres	New 230-kV	Regional
Models 2 and 3					Regional and NAS Lemoore
Model 3					NAS Lemoore
No Action Alternative	None	None		None	None

Note: [1] While the total resulting maximum MWs generated would be the same under both Alternatives 1 and 2, the solar PV system could be distributed over a greater area/combination of sites under Alternative 2 as compared to Alternative 1.

2.2.5 NO ACTION ALTERNATIVE

Under the No Action Alternative, the Navy would not enter into an agreement with a private partner to construct and operate a solar PV system at NAS Lemoore. The No Action Alternative represents the status quo. The No Action Alternative does not meet the purpose and need with regard to meeting Navy renewable energy goals; however, the Navy has analyzed the No Action Alternative in this EA in accordance with statutory requirements and to provide a baseline against which to measure environmental consequences of the action alternatives. The affected environment section of Chapter 3 describes the No Action Alternative (existing conditions) for each resource area. The analysis of the No Action Alternative in Chapter 3 assumes that the Navy would maintain operations at the status quo (no new construction, operations/maintenance, or decommissioning would occur) and continue to use the project area for agricultural purposes.

2.3 ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD FOR DETAILED ANALYSIS

2.3.1 OTHER RENEWABLE ENERGY SOURCES

Given NAS Lemoore's location and associated available resources, the Navy has determined that solar PV represents the best renewable energy option for NAS Lemoore when compared with other renewable energy options (e.g., wind, biomass, tidal, geothermal). Therefore, the Navy has eliminated Other Renewable Energy Sources from detailed analysis in this EA.

2.3.2 OTHER SITES

The Navy considered two other potential sites at NAS Lemoore (C and F) for solar PV power generation.

2.3.2.1 Site C

Potential Site C is located within a designated NAS Lemoore Natural Resource Area (Figure 2-4). The Natural Resource Areas encompass remnant native habitats that NAS Lemoore manages for the benefit of wildlife and native plant communities (NAS Lemoore 2014a). Therefore, the Navy has eliminated Site C from detailed analysis in this EA.

2.3.2.2 Site F

Potential Site F is located within the designated NAS Lemoore Evaporation Ponds (Figure 2-4). These wastewater treatment facility evaporation ponds receive treated sanitary and industrial wastewater, as well as stormwater from NAS Lemoore. The ponds may provide valuable aquatic habitat, as the ponds were found to have many water birds and may offer habitat to amphibians and reptiles as well (NAS Lemoore 2014b). Therefore, the Navy has eliminated Site F from detailed analysis in this EA.

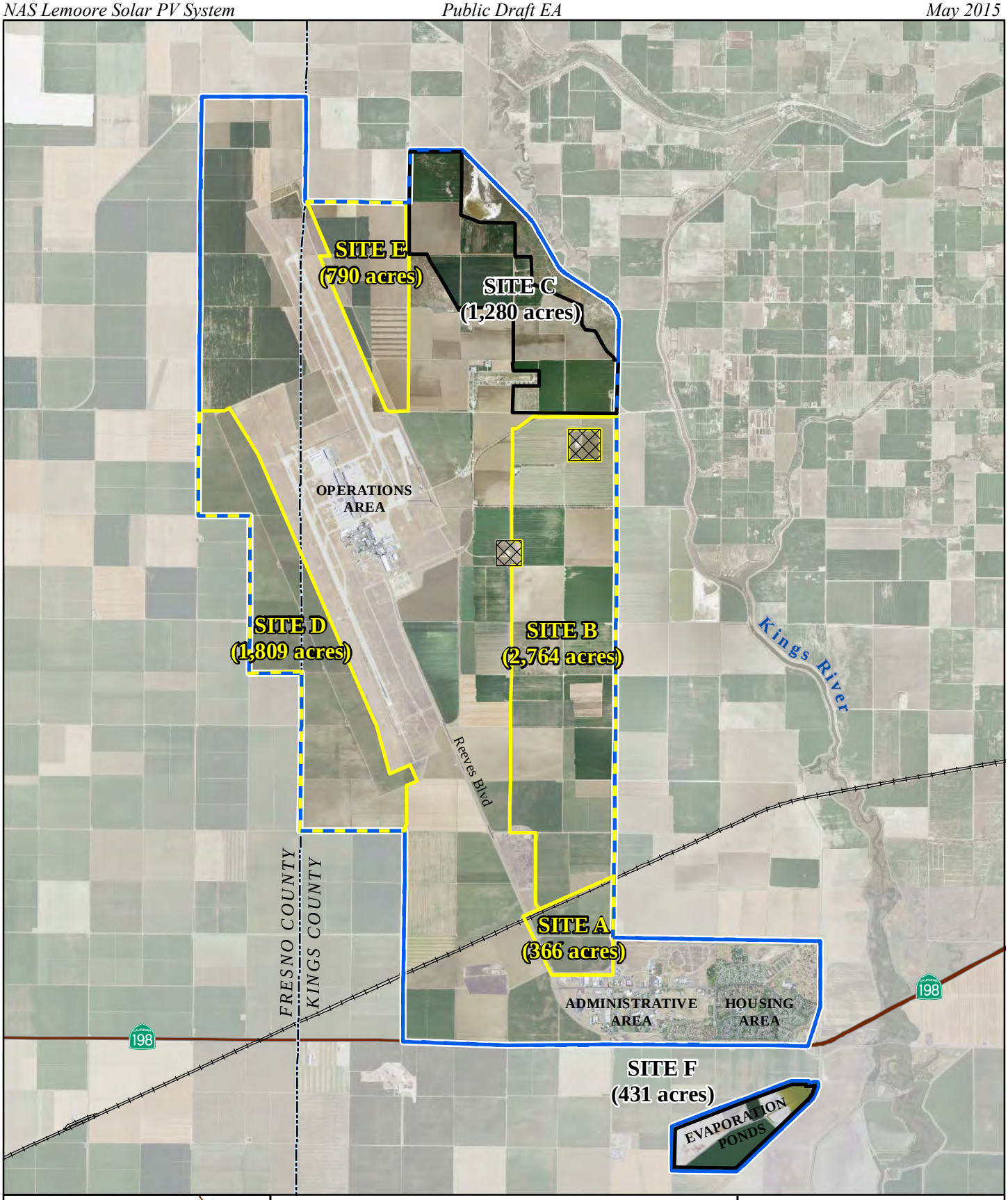

Figure 2-4
Location of Alternatives Considered but Not Carried Forward for Detailed Analysis at NAS Lemoore

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CHAPTER 3
AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the existing environmental conditions and potential environmental consequences for the following resource areas analyzed in detail: land use, biological resources, public health and safety, socioeconomics, visual resources, cultural resources, air quality, utilities, and transportation. Table 3.0-1 provides a summary of environmental consequences and avoidance/minimization measures for each resource area from implementation of the alternatives.

Table 3.0-1. Summary and Potential Impacts and Avoidance/Minimization Measures

Resource Area	Alternative 1: 390 MW		Alternative 2: 390 MW (Sites A, B, D, and/or E)	No Action Alternative
	Sites A and B: 390 MW	Option 1, Site A Only: 20 MW		
Land Use				
Impact Summary	No Significant Impact. Temporary change in land use from agricultural to renewable energy. Consistent with the NAS Lemoore Master Plan. No impact to airfield height restrictions. Partial ESQD overlap of Site B. Temporary impact to farmlands of statewide importance; no long-term conversion would occur.	No Significant Impact. Potential impacts would be similar to those described for Sites A and B; however, no ESQD overlap of Site A would occur.	No Significant Impact. Temporary change in land use from agricultural to renewable energy. Consistent with the NAS Lemoore Master Plan. No impact to airfield height restrictions with Avoidance/Minimization Measures. Partial ESQD overlap of Site B. Temporary impact to farmlands of statewide importance; no long-term conversion would occur.	No Significant Impact. There would be no change in existing conditions; therefore, no impacts would occur.
Avoidance/ Minimization Measures	1. The private partner would prepare and submit construction site plans for review and approval by the DoD Explosive Safety Board for any portion of the project that would occur within an ESQD arc. 2. The private partner would prepare and submit a land evaluation and site assessment (to establish a farmland conversion impact rating score) to the Natural Resources Conservation Service. 3. The private partner would prepare a soil reclamation plan as part of decommissioning activities. The soil reclamation plan would outline the reclamation, restoration, and soil stabilization of the soils designated as farmland of statewide importance upon termination of the project.	Avoidance/Minimization Measures would be the same as measures 2 and 3 presented for Alternative 1, Sites A and B.	In addition to the Avoidance/ Minimization Measures presented for Alternative 1, Sites A and B, the following measure would be implemented under Alternative 2: 4. Transmission lines from Sites D and E would be constructed underground to avoid resulting in an incompatibility with APZ-1 and APZ-2.	No measures identified.

Resource Area	Alternative 1: 390 MW		Alternative 2: 390 MW (Sites A, B, D, and/or E)	No Action Alternative
	Sites A and B: 390 MW	**Option 1, Site A Only: 20 MW**		
Biological				
Impact Summary	No Significant Impact. No impacts to federally listed species due to absence of listed species and suitable habitat. Should federally listed species become established or found to occur in the project area, Avoidance/Minimization Measures would be implemented to lessen impacts to levels of no significance. No population-level adverse effects to birds or bats as a result of mortalities related to "lake effect" of solar PV panels. Increase in habitat for foraging and/or ground-nesting wildlife species under solar PV panels. Sites A and B are located within the potential renewable energy area identified in the INRMP.	No Significant Impact. Potential impacts would be similar to those described for Sites A and B though at a smaller scale.	No Significant Impact. Potential impacts would be the same as those described for Sites A and B; however, Site E is immediately adjacent to NRMAs 4 and 5. There is a potential for wildlife, including special status species, to be impacted by construction and associated auditory and visual disturbances. The San Joaquin kangaroo rat was documented in NRMA 5 as recently as 2011, and habitat for the species currently occurs in the NRMA. As Site E is immediately adjacent to NRMA 5, the potential exists for San Joaquin kangaroo rat to use Site E for overland dispersal or movement. However, as there is no suitable habitat, a lack of burrows within Site E, and the species is primarily nocturnal, the species is not expected to be present during daytime construction activities. Sites D and E are not located within the potential renewable energy area identified in the INRMP.	No Significant Impact. There would be no change in existing conditions; therefore, no impacts would occur.
Avoidance/ Minimization Measures	1. All project activities would be in compliance with the MBTA and its general requirements related to nest impact avoidance guidelines. 2. To avoid impacts to ground-nesting birds, a survey for active nests or nesting activity would be conducted before construction and decommissioning should such activities occur during the nesting season (typically March 15 to August 31). If the survey finds active nests, then construction personnel would either avoid	Avoidance/Minimization Measures would be the same as presented for Alternative 1, Sites A and B.	In addition to the Avoidance/ Minimization Measures presented for Alternative 1, Sites A and B, the following measures would be implemented under Alternative 2, if Site E is selected: 18. Informal consultation with the USFWS would occur before implementation to ensure that mitigations for federally listed species are properly implemented.	No measures identified.

Resource Area	Alternative 1: 390 MW		Alternative 2: 390 MW (Sites A, B, D, and/or E)	No Action Alternative
	Sites A and B: 390 MW	**Option 1, Site A Only: 20 MW**		
	the nests until fledglings have left, or permitted personnel would relocate eggs and chicks following all federal and state regulations and permitting requirements. 3. To the extent feasible, construction activities in or near suitable or occupied bird nesting habitat during the breeding season would be avoided (March 15 to August 31). 4. If construction activities occur during the nesting season for migratory birds, a qualified biologist would conduct preconstruction nesting bird surveys within 14 days before construction activities within a given work area. Tree-nesting raptors and ground-nesting birds would be surveyed for in the project area and adjacent windbreaks. The initial survey would be conducted at least 14 days before construction to allow sufficient time to develop an avoidance strategy if nests are identified. A final survey would be conducted within 24 hours of ground-disturbing activities. 5. If an active nest is identified near a given work area and work cannot be conducted outside the nesting season (March 15 to August 31), a no-activity zone would be established around the nest by a qualified biologist in coordination with the USFWS. Fencing and/or flagging would be used to delineate the no-activity zone. The no-activity zone would be large enough to avoid nest abandonment and would be between 50 and 1,000 feet from the nest, or as otherwise required by the USFWS.		19. If federally listed species are found during pre-construction surveys, they would be relocated using USFWS approved protocols and techniques, if necessary.	

Resource Area	Alternative 1: 390 MW		Alternative 2: 390 MW (Sites A, B, D, and/or E)	No Action Alternative
	Sites A and B: 390 MW	**Option 1, Site A Only: 20 MW**		
	6. NAS Lemoore and the private partner would implement the guidelines in the *Construction And On-Going Operational Requirements* section of the USFWS' *Standardized Recommendations for Protection of San Joaquin Kit Fox Prior to or During Ground Disturbance* (USFWS 2011 or current version). 7. A qualified biologist would conduct pre-construction surveys no less than 14 days and no more than 30 days before the commencement of construction/decommissioning activities to identify potential occupancy by special status species, including burrows or dens greater than 4 inches in diameter that could be used by San Joaquin kit fox. If during construction any burrows greater than 4 inches in diameter are found, they would be investigated to ensure the absence of San Joaquin kit fox. If any San Joaquin kit fox are found, construction would be stopped, and the Navy and wildlife agencies would be immediately notified. 8. NAS Lemoore and the private partner would notify USFWS in writing of the results of the pre-construction/decommissioning survey(s) within 30 days after these activities are completed. 9. If potential San Joaquin kit fox dens are located within the work area and cannot be avoided during construction/decommissioning activities, a USFWS-approved biologist would determine if the dens are occupied.			

Resource Area	Alternative 1: 390 MW		Alternative 2: 390 MW (Sites A, B, D, and/or E)	No Action Alternative
	Sites A and B: 390 MW	Option 1, Site A Only: 20 MW		
	10. If occupied San Joaquin kit fox dens are present within the work area, their disturbance and destruction would be avoided. Pre-construction exclusion zones would be implemented following the most current USFWS procedures (currently USFWS 2011). 11. Focused surveys for San Joaquin kangaroo rat would be conducted by a qualified biologist within 30 days before construction/decommissioning activities. The biologist would conduct burrow searches by systematically walking transects, which would be adjusted based on vegetation height and topography. If burrows suitable for use by San Joaquin kangaroo rat are found within 100 feet of the project area, focused live trapping surveys would be conducted by a qualified and permitted biologist following a methodology approved in advance by the USFWS. 12. If potentially suitable San Joaquin kangaroo rat habitat is discovered in the project area, a 50-foot no disturbance buffer would be implemented around small mammal burrows when live trapping is not conducted or when, in consultation with the USFWS, live trapping results are inconclusive in determining presence/absence for the species. 13. The developer would construct all transmission towers, poles, and lines in accordance with the guidelines in *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* (Avian Power Line Interaction Committee 2006), or the most current version of the guidelines available at the time of construction, and in			

Resource Area	Alternative 1: 390 MW		Alternative 2: 390 MW (Sites A, B, D, and/or E)	No Action Alternative
	Sites A and B: 390 MW	**Option 1, Site A Only: 20 MW**		
	Reducing Avian Collisions with Power Lines: The State of the Art in 2012 (Avian Power Line Interaction Committee 2012). 14. To avoid impacts to burrowing owls, surveys would be conducted before construction and decommissioning activities to assess use of the site(s) by the species. Should burrowing owls be present, they would be actively relocated by a qualified biologist. Relocation would include artificial burrow and perch construction preferably at a suitable location nearby but away from construction, either on-site or at a suitable off-site location. This would be done before breeding season or after fledging stage when the nest/burrows can be covered by weed free hay bales. 15. During construction and decommissioning, a qualified biologist would be on-site daily to monitor and record activities as they pertain to biological resources. Results would be reported on a monthly basis, unless a species of concern is found or suspected to be found, and then the species would be reported immediately. The results of the monitoring would be reported to the NAS Lemoore biologist. 16. During the operations phase, quarterly monitoring surveys and reporting would be conducted at all solar PV arrays by a qualified biologist (day and night surveys) to assess use of the areas by wildlife, vegetation changes, and potential bird/bat mortalities and/or injuries. Results of the surveys would be provided to USFWS and CDFW for comments and recommendations to minimize impacts			

Resource Area	Alternative 1: 390 MW		Alternative 2: 390 MW (Sites A, B, D, and/or E)	No Action Alternative
	Sites A and B: 390 MW	**Option 1, Site A Only: 20 MW**		
	from continuing operations. In addition, quarterly monitoring data would be shared and coordinated with wildlife hazard management operations already occurring at NAS Lemoore, including BASH surveys, wildlife determent, and wildlife relocation/removal from areas in and around the NAS Lemoore Airfield (Lang 2012). 17. If federally listed species are observed in the project area following construction activities and/or during operation of the solar PV system, NAS Lemoore would be immediately notified. The Navy would assess whether ongoing operations might affect any such species and engage in consultation with the USFWS to discuss current and future management strategies, as appropriate.			
Public Health and Safety				
Impact Summary	No Significant Impact. Operation of the solar PV panels would not result in an increased flight safety risk, except glare from the northernmost panels at Site B could affect Runway 14L operations in the afternoon. Due to the lack of airspace penetration, reflectivity, and non-interference with communications from Sites A and B, and no evidence that solar PV arrays would increase bird activity, there would be no significant impacts on flight safety during construction or operation of the solar PV system. No increase in BASH potential. Construction and decommissioning activities would be conducted in compliance with health and safety regulations and would not pose a risk to construction personnel. No impact to workers from SDZs.	No Significant Impact. Potential impacts would be similar to those described for Sites A and B, though at a smaller scale. In addition, with the elimination of Site B, the potential effect to afternoon operations at Runway 14L would not occur.	No Significant Impact. Potential impacts would be the same as those described for Sites A and B; however, with solar PV panels facing south for optimum sun exposure, there is potential for glare from fixed solar PV arrays in almost half of Site D and all of Site E to affect the control tower.	No Significant Impact. There would be no change in existing conditions; therefore, no impacts would occur.

Resource Area	Alternative 1: 390 MW		Alternative 2: 390 MW (Sites A, B, D, and/or E)	No Action Alternative
	Sites A and B: 390 MW	**Option 1, Site A Only: 20 MW**		
Avoidance/ Minimization Measures	1. Construction activities that have a potential to generate substantial amounts of dust (e.g., initial site grading) would be first coordinated and scheduled with NAS Lemoore Operations to avoid potential impacts to aviation training. 2. If the currently inactive skeet ranges are activated, work within the SDZ overlap of Site B would only occur when the skeet ranges are closed.	Avoidance/Minimization Measures would be the same as measure 1 presented for Alternative 1, Sites A and B.	In addition to the Avoidance/ Minimization Measures presented for Alternative 1, Sites A and B, the following measures would be implemented under Alternative 2: 3. A tracking solar PV system (single-axis) would be needed to reduce glare from the solar PV panels at Sites D and E towards the control tower. 4. Rifle range activities would be deconflicted with worker access within the SDZ overlap of Site E.	No measures identified.
Socioeconomics				
Impact Summary	<u>No Significant Impact.</u> Loss in agricultural lease income of approximately $318,500 annually; loss of revenue could potentially be completely offset by the lease fee to be paid by the private partner to the Navy. Loss of an estimated $5,947,000 in annual crop value from the local economies of Kings and Fresno counties; or, a loss of 0.13 percent of the annual market value for crops in Kings and Fresno counties. Elimination of approximately 24 agricultural jobs. Construction would create approximately 300 temporary construction jobs. Temporary decrease in demand for irrigation water.	<u>No Significant Impact.</u> Potential impacts would be similar to those described for Sites A and B, though at a smaller scale. Specifically, a reduction in annual lease revenues by approximately $37,200. Estimated annual loss in annual crop value totals $695,400, or approximately 0.01 percent of the total combined annual crop value of Kings and Fresno counties. Loss of approximately 3 agriculture jobs; however, creation of approximately 100 temporary construction jobs.	<u>No Significant Impact.</u> Potential impacts would be the same as those described for Sites A and B.	<u>No Significant Impact.</u> There would be no change in existing conditions; therefore, no impacts would occur.
Avoidance/ Minimization Measures	No measures identified.	No measures identified.	No measures identified.	No measures identified.

Resource Area	Alternative 1: 390 MW		Alternative 2: 390 MW (Sites A, B, D, and/or E)	No Action Alternative
	Sites A and B: 390 MW	**Option 1, Site A Only: 20 MW**		
Visual				
Impact Summary	No Significant Impact. Construction impacts would be temporary and limited to viewers from adjacent roadways and agriculture parcels. The solar PV system would be compatible with NAS Lemoore's visual character. The approximately fifty-five, 80-foot (24-meter) tall steel poles for the new 230-kV transmission line would be visible to persons in the Administrative/Housing Area but would be consistent with the existing visual environment.	No Significant Impact. Potential impacts would be similar to those described for Sites A and B, though at a smaller scale. In addition, under Model 2 and the combination of Models 2 and 3, the 69-kV transmission line poles would be shorter (approximately 58 feet tall. Under Model 3, no transmission line/poles would be constructed.	No Significant Impact. Potential impacts would be similar as those described for Sites A and B; however, if Sites D and/or E are selected, segments of the transmission lines from these sites would be underground, thus having no visual impact when underground. Other segments of the 230-kV transmission line would be above ground and visible.	No Significant Impact. There would be no change in existing conditions; therefore, no impacts would occur.
Avoidance/ Minimization Measures	No measures identified.	No measures identified.	No measures identified.	No measures identified.
Cultural				
Impact Summary	No Significant Impact. The three archaeological sites within the APE are either ineligible for listing on the NRHP (therefore not a historic property) or would be avoided during construction, operation, and decommissioning activities. The Navy has requested the SHPO concur with a finding of "No Historic Properties Affected" finding.	No Significant Impact. The two archaeological sites within the APE would be avoided during construction, operation, and decommissioning activities. The Navy has requested the SHPO concur with a finding of "No Historic Properties Affected" finding.	No Significant Impact. The three archaeological sites within the APE are either ineligible for listing on the NRHP (therefore not a historic property) or would be avoided during construction, operation, and decommissioning activities. No recorded cultural resources are present within Sites D and E. The Navy has requested the SHPO concur with a finding of "No Historic Properties Affected" finding.	No Significant Impact. There would be no change in existing conditions; therefore, no impacts would occur.

Resource Area	Alternative 1: 390 MW		Alternative 2: 390 MW (Sites A, B, D, and/or E)	No Action Alternative
	Sites A and B: 390 MW	**Option 1, Site A Only: 20 MW**		
Avoidance/ Minimization Measures	1. In the event of a discovery during any excavation, the contractor would be required to immediately stop work in the area of the discovery and immediately notify the Navy of the discovery. The Navy would have the discovery site evaluated by a professional archeologist, and in consultation with the SHPO. If the discovery is determined to qualify for listing on the NRHP, the Navy would develop and implement an appropriate treatment plan before authorizing the excavation or construction responsible for the discovery to proceed.	Avoidance/Minimization Measures would be the same as presented for Alternative 1, Sites A and B.	Avoidance/Minimization Measures would be the same as presented for Alternative 1, Sites A and B.	No measures identified.
Air Quality				
Impact Summary	No Significant Impact. Minor and temporary increase in emissions generated as a result of construction, operational maintenance, and decommissioning. Operationally, fewer GHG and particulate matter emissions due to the switch to renewable energy. Reduction in dust generation associated with the ending of agriculture operations. Emissions would not exceed *de minimis* thresholds. Hazardous air pollutant emissions would be negligible.	No Significant Impact. Potential impacts would be similar to those described for Sites A and B, though at a smaller scale.	No Significant Impact. Potential impacts would be similar as those described for Sites A and B; however, if Sites D and/or E are selected, segments of the transmission lines from these sites would be underground, thus resulting in more construction and ground disturbance and greater project emissions.	No Significant Impact. There would be no change in existing conditions; therefore, no impacts would occur.
Avoidance/ Minimization Measures	1. Proper and routine maintenance of all vehicles and other construction equipment would be implemented to ensure that emissions are within design standards. 2. Dust suppression methods (such as using water trucks to wet the construction/decommissioning area during construction, and the application of a soil stabilizer during operation) would minimize fugitive dust emissions. 3. Construction equipment with combustive engines would meet USEPA Tier 4 emission standards, as practicable to do so.	Avoidance/Minimization Measures would be the same as presented for Alternative 1, Sites A and B.	Avoidance/Minimization Measures would be the same as presented for Alternative 1, Sites A and B.	No measures identified.

Resource Area	Alternative 1: 390 MW		Alternative 2: 390 MW (Sites A, B, D, and/or E)	No Action Alternative
	Sites A and B: 390 MW	**Option 1, Site A Only: 20 MW**		
Utilities				
Impact Summary	No Significant Impact. Potential for temporary and localized power disruption when the solar PV system comes on-line. Would support achievement of Navy's renewable energy goals and strategies. Under the Model 2 and combination of Models 2 and 3, there would be an increase in regional power supply. Under Model 3, a local renewable energy source would be created for NAS Lemoore. Existing and/or new electrical infrastructure would be sufficient to support the solar PV system.	No Significant Impact. Potential impacts would be similar to those described for Sites A and B, though at a smaller scale.	No Significant Impact. Potential impacts would be the same as those described for Sites A and B.	No Significant Impact. There would be no change in existing conditions; therefore, no impacts would occur.
Avoidance/ Minimization Measures	No measures identified.	No measures identified.	No measures identified.	No measures identified.
Transportation				
Impact Summary	No Significant Impact. Temporary increase in traffic associated with construction (740 daily vehicle trips), operations and maintenance, and decommissioning activities (150 daily vehicle trips). Some of the trips associated with these activities (i.e., delivery of construction materials and equipment; the removal of construction debris; and operations and maintenance) would be periodic, and would not regularly add traffic to the roadway network. Moreover, because the construction areas are outside of fenced areas on the installation, traffic would not contribute toward any delays or queues at the Reeves Gate, the Avenal Gate, or the Operations Side Main Gate.	No Significant Impact. Potential impacts would be the same as those described for Sites A and B, though at a smaller scale (less daily vehicle trips).	No Significant Impact. Potential impacts would be the same as those described for Sites A and B.	No Significant Impact. There would be no change in existing conditions; therefore, no impacts would occur.

Resource Area	Alternative 1: 390 MW		Alternative 2: 390 MW (Sites A, B, D, and/or E)	No Action Alternative
	Sites A and B: 390 MW	**Option 1, Site A Only: 20 MW**		
Avoidance/ Minimization Measures	1. Worker and equipment/materials delivery vehicles would avoid use of any of the gates providing access to the fenced areas of the installation (i.e., the Operations Side and the Administrative Side/Family Housing Area) and the NAS Lemoore Main Gate, especially during peak commuting periods (typically between 7:00 and 9:00 a.m. and 4:30 to 6:30 p.m.).	Avoidance/Minimization Measures would be the same as presented for Alternative 1, Sites A and B.	Avoidance/Minimization Measures would be the same as presented for Alternative 1, Sites A and B.	No measures identified.

Notes: APE = area of potential effects; APZ = Accident Potential Zone; BASH = Bird Aircraft Striking Hazard; CDFW = California Department of Fish and Wildlife; ESQD = Explosive Safety Quantity Distance; GHG = Greenhouse Gas; INRMP = Integrated Natural Resources Management Plan; kV = kilovolt; MBTA = Migratory Bird Treaty Act; NRHP = National Register of Historic Places; NRMA = Natural Resources Management Areas; SDZ = Surface Danger Zones; SHPO = State Historic Preservation Officer; USFWS = U.S. Fish and Wildlife Service.

3.1 LAND USE

3.1.1 DEFINITION OF RESOURCE

Land use refers to the various ways in which land might be used or developed (i.e., military training, parks and preserves, agriculture, commercial); the kinds of activities allowed (i.e., factories, mines rights-of-way); and the type and size of structures permitted (i.e., towers, single-family homes, multistory office buildings). Land use is regulated by management plans, policies, ordinances, and regulations that determine the types of uses that are allowable and protect specially designated areas and environmentally sensitive resources. The NAS Lemoore Master Plan 2030 (NAS Lemoore 2014b) guides land use and development on NAS Lemoore.

This resource section includes a discussion of prime farmland. The Farmland Protection and Policy Act, 7 USC 4201, was enacted to minimize the loss of prime farmland and unique farmlands because of federal actions, through conversion of these lands to nonagricultural uses. This includes converting areas that have high quality soil for crop production.

3.1.2 AFFECTED ENVIRONMENT

3.1.2.1 Site A, B, D, and E

Sites A, B, D, and E are agricultural outleases surrounding the NAS Lemoore Operations Area (Figure 3.1-1). NAS Lemoore operates approximately 53 agricultural outleases on 12,776 acres (5,170 hectares) with 16 lessees. Sites A, B, D, and E are located within the "Managed Lands District", a 12,709-acre (5,143-hectare) area used to provide a buffer around NAS Lemoore operations. Land uses within this area include agriculture, managed grazing lands, and natural resource management areas.

The NAS Lemoore Master Plan identifies development plans within the Managed Lands District. Permitted uses within the Managed Lands District include agriculture, grazing lands, Natural Resources Management Areas (NRMA), and solar PV development. Development plans within the Managed Lands District should be reevaluated regularly as opportunities, solar PV, agriculture market, and other conditions change. The District can support up to 3,000 acres (1,214 hectares) of solar PV development (NAS Lemoore 2014a).

Nearby land uses include the San Joaquin Valley Railroad, which crosses NAS Lemoore along the northern portion of Site A (NAS Lemoore 2014b). Two transmitter buildings associated with flight communications are located within Site B.

Accident Potential Zones and Imaginary Surface Restrictions

APZs identify areas that would most likely be affected by an aircraft accident. The purpose of defining APZs is to identify areas where surrounding land uses should be restricted to protect the public, pilots, and property on the ground. Portions of Sites B and D are overlapped by Accident Potential Zones (APZ) 1 and 2 (see Figure 2-1). Conversely, Sites A and E are not encumbered by the APZs (NAS Lemoore 2014b).

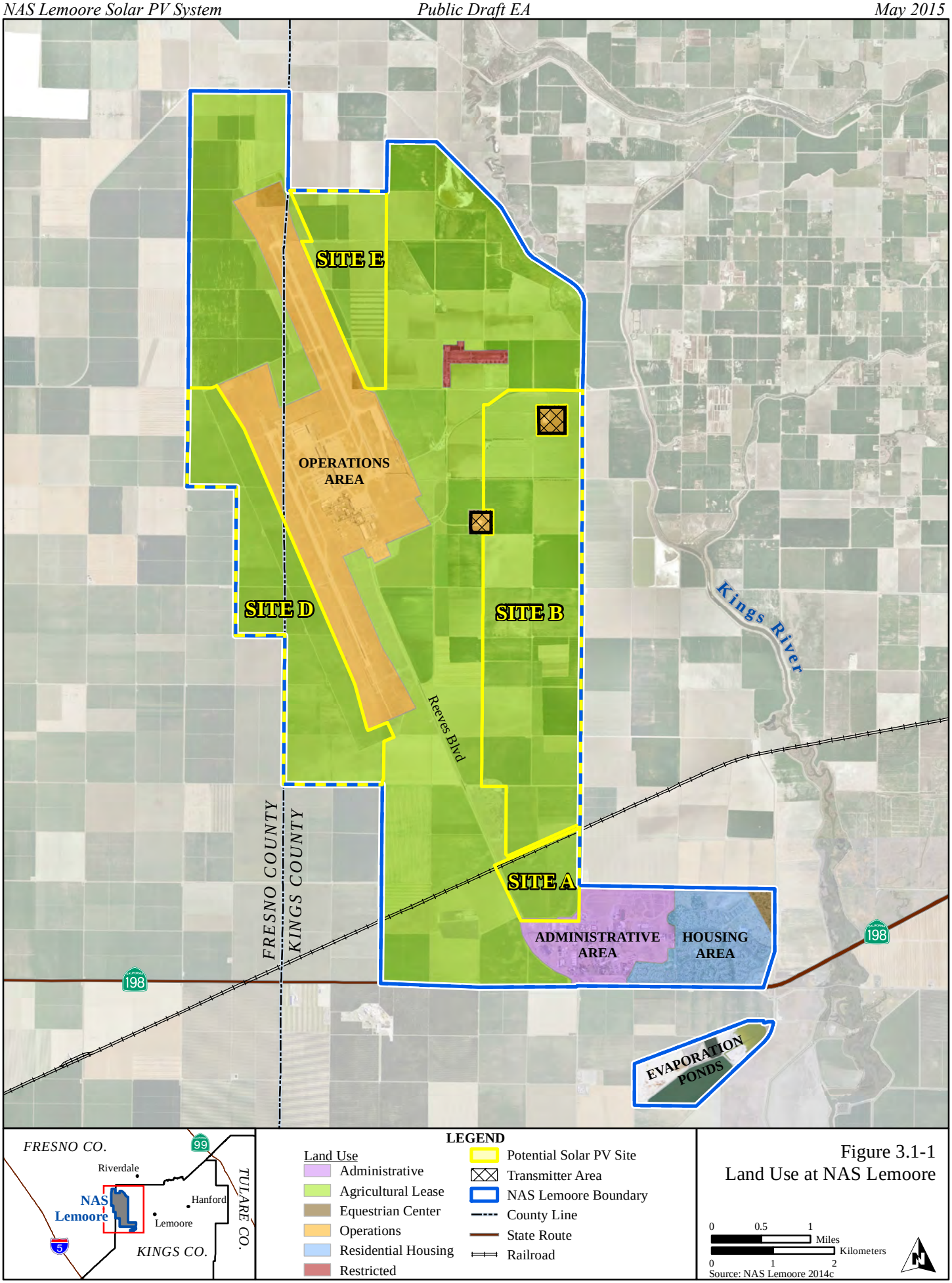

Figure 3.1-1
Land Use at NAS Lemoore

Another land use issue associated with air operations is the proximity of structures to imaginary surfaces. An imaginary surface is the slope or angle at which an aircraft departs or arrives at an airfield. Imaginary surfaces are another way to describe clearances for air navigation. Federal aviation regulations specify a series of imaginary height restrictions surfaces surrounding an airport to prevent conflicts with aircraft approach and departure paths. The Federal Aviation Administration (FAA) considers any terrain or engineered objects that extend above the imaginary surface as an obstruction. The imaginary surface should not be penetrated and all new development should not extend into the imaginary surfaces.

Imaginary surfaces at NAS Lemoore restrict or limit the height of structures for safety purposes (NAS Lemoore 2014a). All of the proposed sites have assigned imaginary surfaces (Figure 3.1-2).

Department of Defense (DoD) Instruction 4165.57, *Air Installation Compatible Use Zones*, establishes policies and procedures for issues related to land use, noise, and safety within and around air installations. The DoD instruction prohibits power lines (including high-voltage transmission and distribution lines) within APZs.

Explosive Safety Quantity Distance Arcs

Explosive Safety Quantity Distance (ESQD) arcs define the prescribed minimum distance between sites storing or handling hazard Class I explosive materials and specific exposures (i.e., inhabited buildings public highways, railways) to afford an acceptable degree of protection and safety to the specified exposure. The size of the ESQD arc is proportional to the net explosive weight present. An ESQD arc overlaps a portion of northwestern area of Site B and the southern portion of Site E (Figure 3.1-3). The Chief of Naval Operations Ammunition and Hazardous Material Handling Review Board has authorized Exemption NAS Lemoore E-1-81. This exemption permits the agricultural outlease of land that falls within an ESQD arc. The agricultural outlease exemption allows for the cultivation of non-labor-intensive/machine harvested crops (Navy 2014b).

Overarching ESQD guidance for all services is found in DoD Standard 6055.09-M, *DoD Ammunition and Explosives Safety Standards*. All service regulations must comply with and reinforce the guidance in this regulation. The Navy has provided supplemental guidance for shore-based units and the Marine Corps in Navy Sea Systems Command Operations Publication – 5, Volume 1, *Ammunition and Explosive Safety Ashore.* Although the services have some authority to build near a potential explosive site if certain conditions are met, all new construction site plans within established explosive arcs must be reviewed and approved by the DoD Explosive Safety Board. Not all construction requires a waiver to established standards, but construction does require review and approval of the DoD Explosive Safety Board as well as a solar energy developer willing to shoulder the risks – to life, property and capital – of developing within an ESQD arc. The Navy is considering changes Navy Sea Systems Command Operations Publication – 5, Volume 1 to address the increase in requests to accept renewable energy projects within an explosive arc of a potential explosive site (ICF International 2012).

Soils Designated as Farmland of Statewide Importance

All of Sites A, B, D, and E contain soils designated as farmland of statewide importance. Farmland of statewide importance is land that is of statewide importance for the production of food, feed, fiber, forage, and oil seed crops. Generally, farmlands of statewide importance include those that are nearly prime farmland and that produce high yields of crops when treated and managed according to acceptable farming methods. Some may produce as high a yield as prime farmlands if conditions are favorable (U.S. Department of Agriculture [USDA] 2014a).

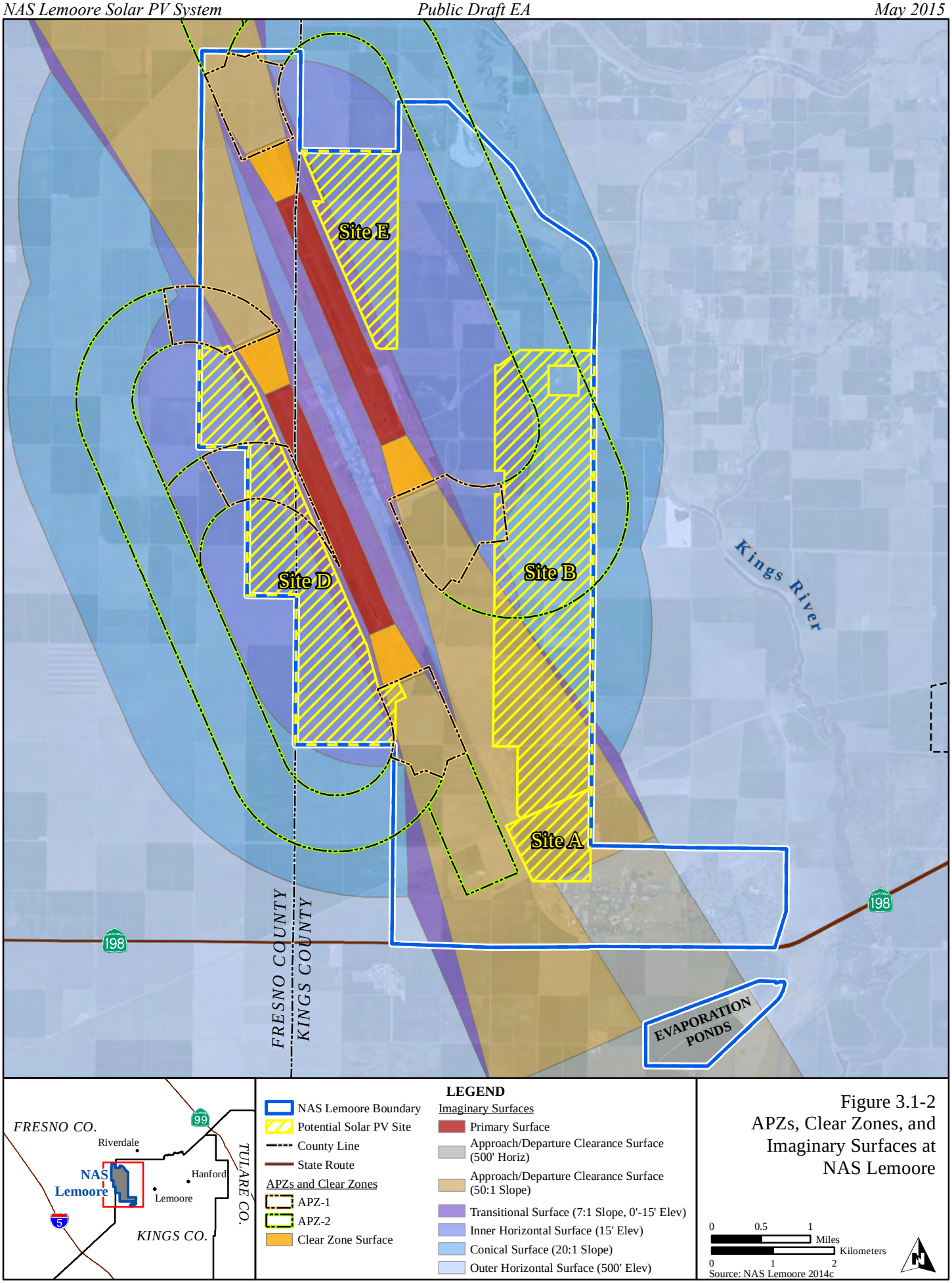

Figure 3.1-2
APZs, Clear Zones, and Imaginary Surfaces at NAS Lemoore

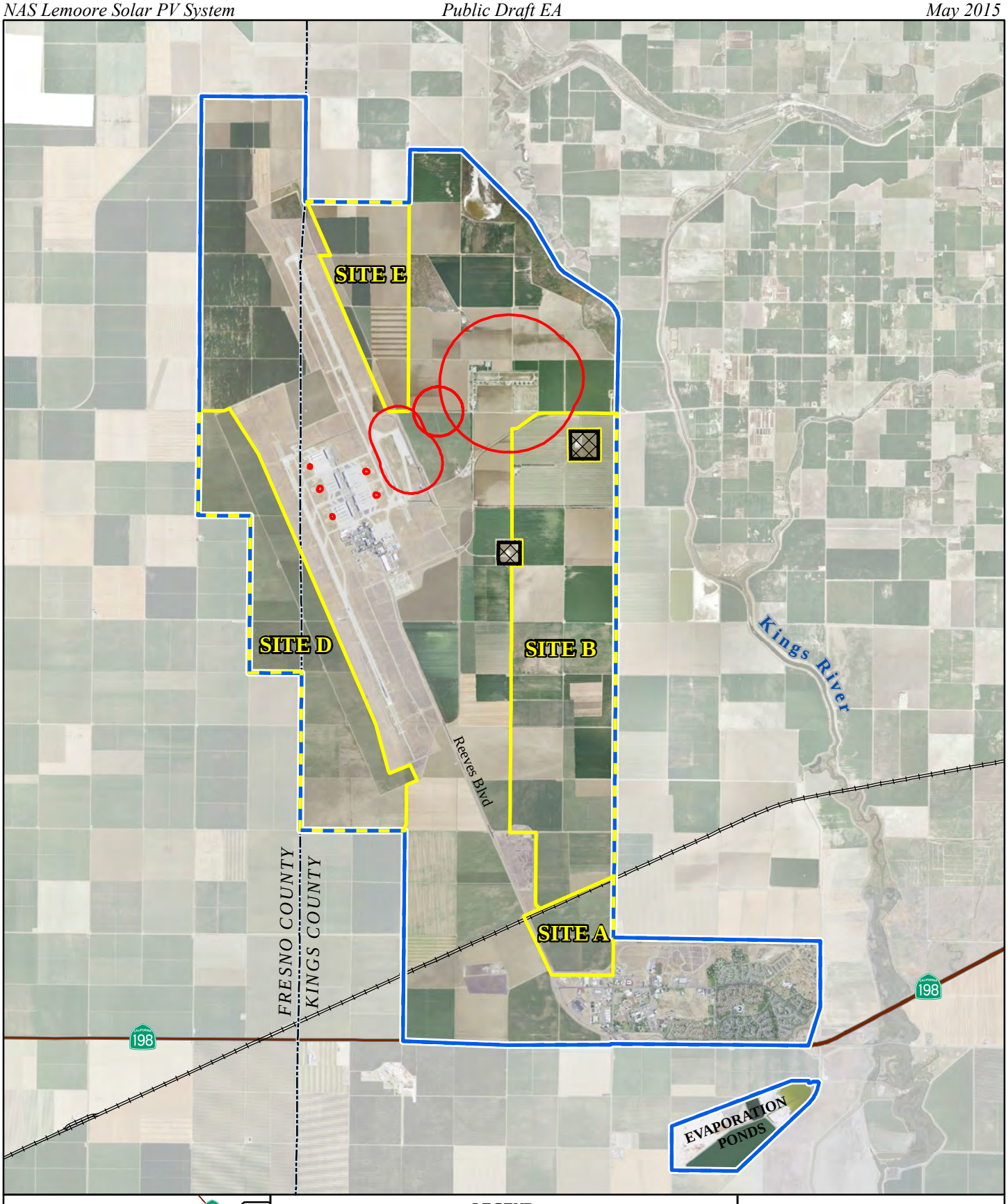

Figure 3.1-3
ESQD Arcs at NAS Lemoore

If a project has the potential to convert soils designated as farmland of statewide importance to a non-farm use, a land evaluation and site assessment is needed to establish a farmland conversion impact rating score. Use of farmland by a federal agency for national defense purposes during a national emergency is exempted from the Farmland Protection Policy Act.

3.1.2.2 Potential Solar PV System Support Areas

Equestrian Center

The NAS Lemoore equestrian center is located in the northeast portion of the housing area (see Figure 3.1-1). The equestrian center provides stables for up to 30 horses over approximately 10 acres (4 hectares) (NAS Lemoore 2014b). The area provides no farmland of statewide importance.

3.1.2.3 Transmission Lines and Substations

An existing 69-kV electrical transmission line, that is owned and maintained by NAS Lemoore, borders Sites A and B to the east, and runs along 25th Street. An existing PG&E 230-kV electrical transmission line borders the equestrian center to the east of NAS Lemoore property. All of the action alternatives (with the exception of Alternative 1 Option) involve the construction of a potential east-west transmission line along the northern boundary of the Administrative/Housing Area. The land use in this area functions to promote sailor/family readiness and is part of the Administration and Housing Areas. All other potential corridors would occur within utility rights-of-way on agricultural lease areas (NAS Lemoore 2014b).

3.1.3 ENVIRONMENTAL CONSEQUENCES

3.1.3.1 Alternative 1: Construction, Operation, and Decommissioning of an up to 390 MW Solar PV System at Sites A and B

Sites A and B

Construction

Under Alternative 1, the construction of a solar PV system would result in a temporarily change in land use for Sites A and B from agricultural to renewable energy. This change would be consistent with the NAS Lemoore Master Plan as solar PV development is a permitted use within the Managed Lands District.

Under Alternative 1, northern portions of Site B would be located within APZ-2. Upon completion, the highest point of the solar PV array would be no higher than approximately 15 feet (5 meters). The solar PV system would be below the 150-foot (45-meter) high airfield height restriction (i.e., imaginary surface restriction). Construction of the solar PV system transmission lines associated with Sites A and B would occur within associated utility rights-of-way and would not represent a land use change. The aboveground 230-kV transmission line along the eastern boundary of Site B would be outside of APZ-2. The proposed switching station for interconnection to the existing PG&E 230-kV overhead transmission line would occur adjacent to the NAS Lemoore equestrian center in an open area.

Under Alternative 1, the northwestern portion of Site B would be overlapped by an ESQD arc. All new construction site plans within an ESQD must be reviewed and approved by the DoD Explosive Safety Board. If the DoD Explosive Safety Board does not grant a waiver or exemption for the area of encumbrance, and/or a renewable-energy related revision to NAVSEA OP-5, Volume 1 does not occur,

the site border would be adjusted inward such that the solar PV system would not be overlapped by the ESQD arc.

Soils below the solar PV system would largely remain unchanged; however, the surface would be temporarily converted from farmland to a non-farm use. Model 2 and the combination of Models 2 and 3 would need to comply with the Farmland Protection and Policy Act provisions including the completion of a farmland conversion impact rating form. If Model 3 is implemented, the action may be exempted from the Farmland Protection and Policy Act because the power would solely be utilized at NAS Lemoore.

Operation

Operation of the solar PV system at Sites A and B would be consistent with the NAS Lemoore Master Plan, as solar PV systems have been identified as a possible land use for the agricultural lands surrounding NAS Lemoore. The solar PV system operation would be passive and not impact adjacent land uses.

Decommissioning

The decommissioning of the solar PV system would return the project area to its pre-project condition. At the conclusion of the solar PV agreement, agricultural activities could resume, as to be determined by NAS Lemoore.

Summary

The construction, operation, and decommissioning of the solar PV system at Sites A and B would be consistent with the NAS Lemoore Master Plan. Alternative 1 would comply with requirements applicable to the operation of a solar PV system within an ESQD arc. Soils designated as farmland of statewide importance would largely remain unchanged and would be available for future agricultural use. Therefore, implementation of Alternative 1 would not have a significant impact to land use.

Alternative 1 Option: Construction, Operation, and Decommissioning of a 20 MW Solar PV System at Site A

Under the Alternative 1 Option, impacts to land use would be the same as those described under Alternative 1; however, the impacts would be limited to Site A. No ESQD overlap would occur. Therefore, implementation of the Alternative 1 Option would not have a significant impact to land use.

3.1.3.2 Alternative 2: Construction, Operation, and Decommissioning of an up to 390 MW Solar PV System at Sites A, B, D, and/or E

As Alternative 2 would develop up to 390 MW of solar PV power (the same as Alternative 1), the approximate extent of surface impact (2,730 acres [1,104 hectares]) would be the same as Alternative 1; however, the location of the impact would be different (potentially up to four sites for Alternative 2 as opposed to two sites for Alternative 1).

Sites A, B, D, and/or E

Construction

The construction of a solar PV system at Sites A, B, D, and/or E would be as presented for Alternative 1, with the following differences.

If Sites D and/or E are developed, the segments of the 230-kV transmission line that would be within the APZs would be underground to avoid encroachment on the existing flight easement (see Figure 2-3). The flight easement does not allow vertical structures above 25 feet (8 meters) tall. In addition, DoD Instruction 4165.57, Air Installation Compatible Use Zones, specifies that no above ground power transmission or distribution lines should occur within APZs.

Construction of the solar PV system transmission lines associated with Sites A and B would occur within associated utility rights-of-way and would not represent a land use change. The flight easement does not allow vertical structures above 25 feet (8 meters) tall. The proposed switching station for interconnection to the existing PG&E 230-kV overhead transmission line would occur adjacent to the equestrian center (stables). The equestrian center would continue to provide family support and outdoor recreational opportunities for NAS Lemoore residents and employees.

Under Alternative 2, in addition to the northwestern portion of Site B, the southern portion of Site E would be overlapped by an ESQD arc. The same impacts and measures as described for Site B under Alternative 1 would apply.

Operation

Operation of the solar PV system at Sites A, B, D, and/or E would be consistent with the NAS Lemoore Master Plan, as solar PV systems have been identified as a possible land use for the agricultural lands surrounding NAS Lemoore. The solar PV system operation would be passive and not impact adjacent land uses.

Decommissioning

The decommissioning of the solar PV system would return the project area to its pre-project condition. At the conclusion of the solar PV agreement, agricultural activities could resume, as to be determined by NAS Lemoore.

Summary

The operation of the solar PV system at Sites A, B, D and/or E would be consistent with the NAS Lemoore Master Plan, as solar PV systems have been identified as a possible land use for the agricultural lands surrounding NAS Lemoore. Alternative 2 would comply with requirements applicable to the operation of a solar PV system within an ESQD arc. Soils designated as farmland of statewide importance would largely remain unchanged and would be available for future agricultural use. Therefore, implementation of Alternative 2 would not have a significant impact to land use.

3.1.3.3 No Action Alternative

Under the No Action Alternative, existing land use would not change. Agricultural lands would continue to be a compatible with NAS Lemoore's military mission and the Managed Lands District. Established APZs and imaginary surface restrictions would remain as is. No overlap of ESQD arcs by incompatible land uses would occur. Farmland of statewide importance would continue to be used for agricultural purposes. Therefore, the No Action Alternative would not have a significant impact to land use.

3.2 BIOLOGICAL RESOURCES

3.2.1 DEFINITION OF RESOURCE

Biological resources include plant and animal species and the habitats within which they occur. This analysis focuses on species that are important to the function of ecosystems, are of special societal

importance, or are protected under federal or state law. These resources are commonly divided into the following categories: *Plant Communities*, *Wildlife*, and *Special Status Species*.

Biological resources are grouped and analyzed in this EA as follows:

- *Plant Communities* include plant associations and dominant constituent species that occur in the project area. Special status plant species are discussed in more detail below.
- *Wildlife* includes the characteristic animal species that occur in the project area. Special consideration is given to bird species protected under the Migratory Bird Treaty Act and EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*. Special status wildlife species are discussed in more detail below.
- *Special Status Species* are those plant and animal species that are listed, have been proposed for listing, or are candidates for listing as threatened or endangered under the federal Endangered Species Act (ESA), the California ESA, and other species of concern as recognized by state or federal agencies.

3.2.2 AFFECTED ENVIRONMENT

3.2.2.1 Plant Communities

All of the potential solar PV system sites are currently leased by the Navy for agriculture use and are regularly disturbed, mechanically and chemically (herbicides/pesticides), for crop production (Figures 3.2-1 to 3.2-4). There is very little natural vegetation in the agricultural areas, as the fields are plowed or disked to the edge of roads and irrigation ditches (NAS Lemoore 2014a). Non-native, herbaceous plant species are sparsely distributed along the borders of unpaved access roads and irrigation ditches near the agricultural fields.

Windbreaks and irrigation ditches occur along the agricultural parcel boundaries within the potential solar PV sites. Most of the windbreaks at NAS Lemoore are planted with non-native gum trees (*Eucalyptus* spp.) or oleander (*Nerium oleander*).

The irrigation ditches on NAS Lemoore would not be directly impacted by project activities; therefore, the jurisdictional status of these man-made waterways is not analyzed in this EA. However, these artificial waterways likely attract a higher variety of wildlife and provide benefits to wildlife beyond those provided by the fallow agricultural fields. Wildlife within the project area is discussed in Section 3.2.2.2.

The proposed switching station site (located adjacent to equestrian center in the northeast portion of the NAS Lemoore housing area) is highly disturbed and is dominated by non-native, ruderal species and bare ground. All of the potential and/or existing transmission line corridors and potential substation locations are within heavily disturbed habitats, including agricultural fields, existing dirt roads, and otherwise developed/disturbed lands that do not contain native habitats (Figures 3.2-1 to 3.2-4).

The NAS Lemoore Integrated Natural Resources Management Plan (INRMP) identifies potential renewable energy areas at NAS Lemoore. While the areas associated with Sites A and B are located within the identified potential renewable energy area, Sites D and E are not (NAS Lemoore 2014b).

Figure 3.2-1
Biological Resources at Site A

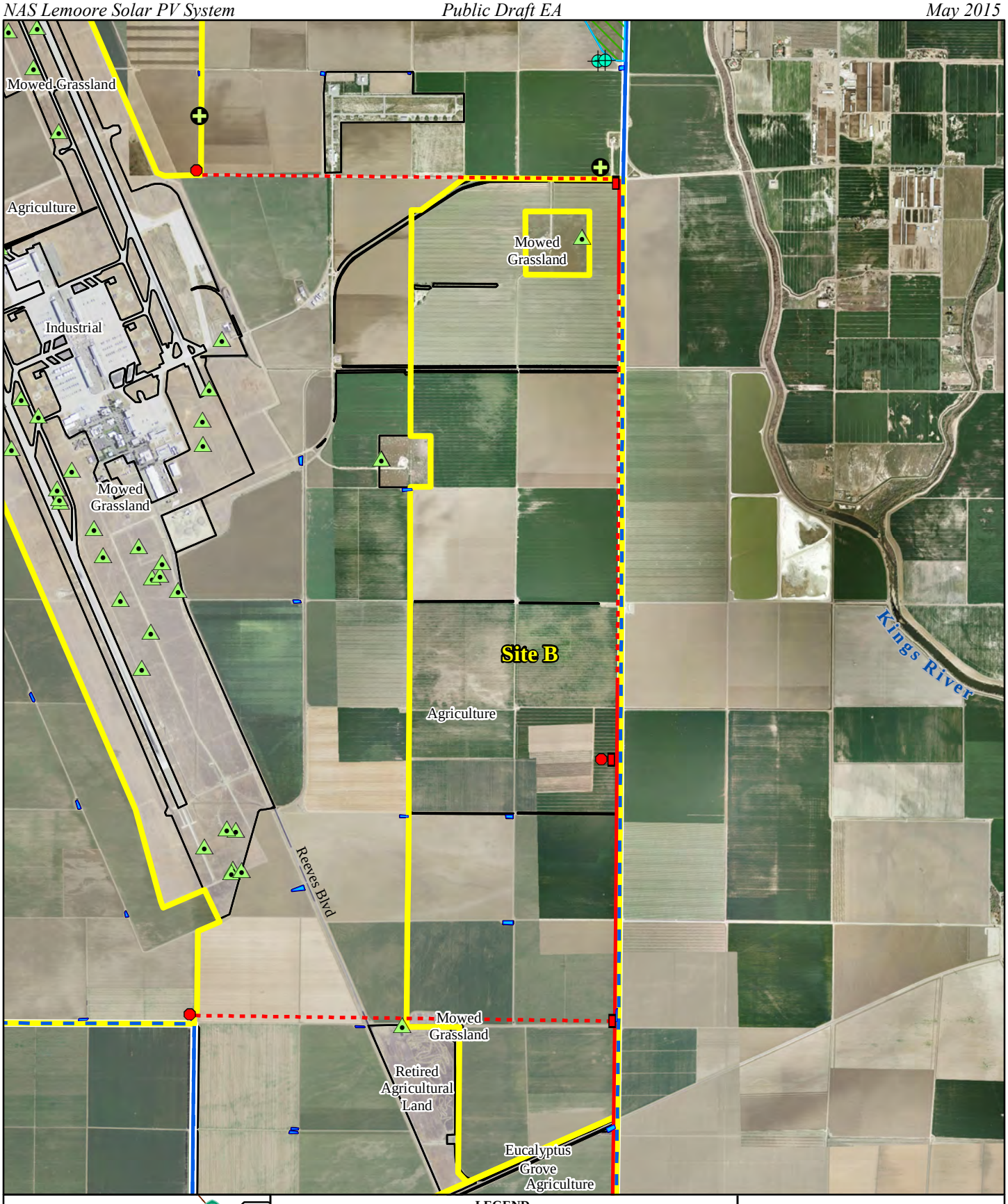

Figure 3.2-2
Biological Resources at Site B

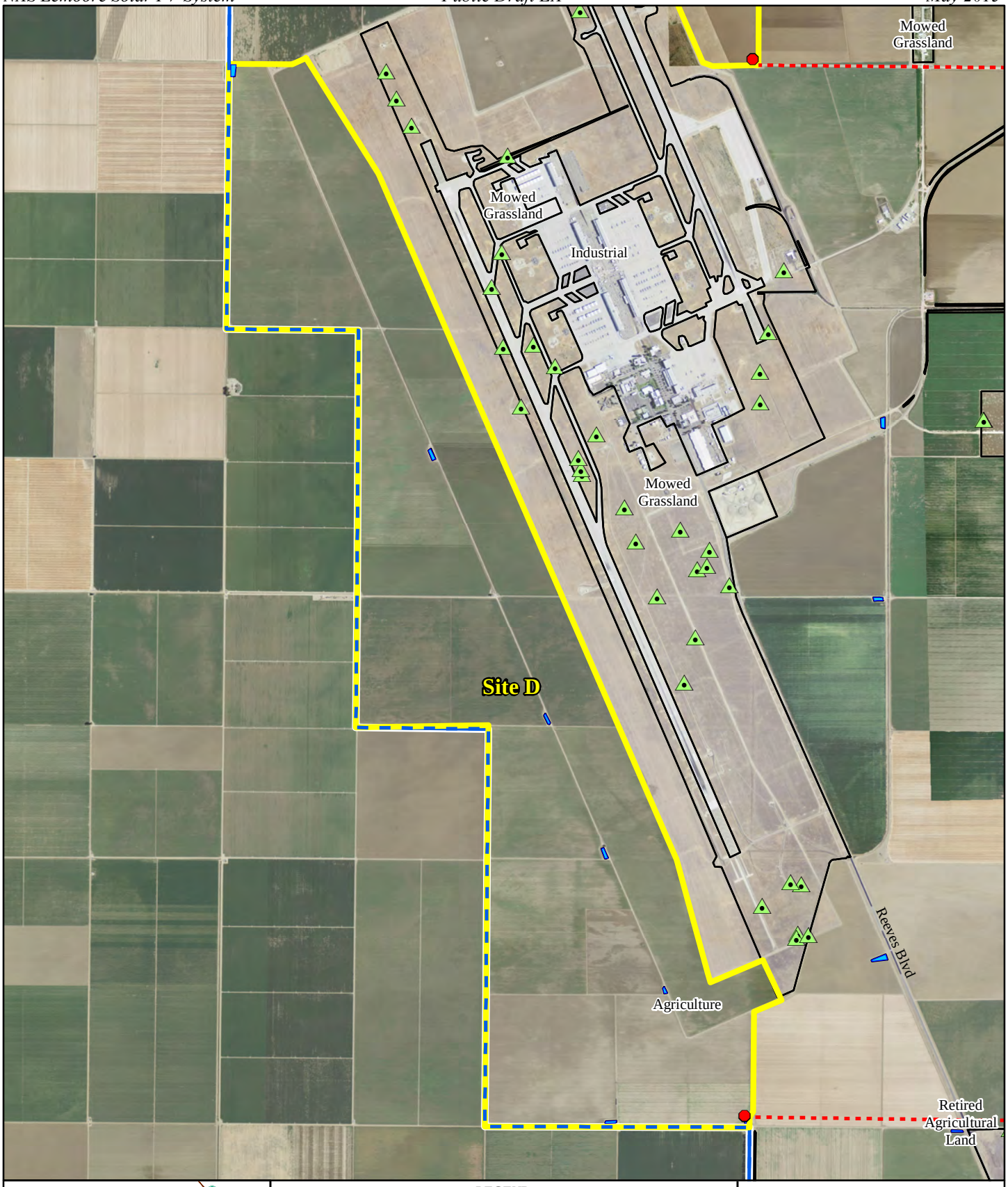

Figure 3.2-3
Biological Resources at Site D

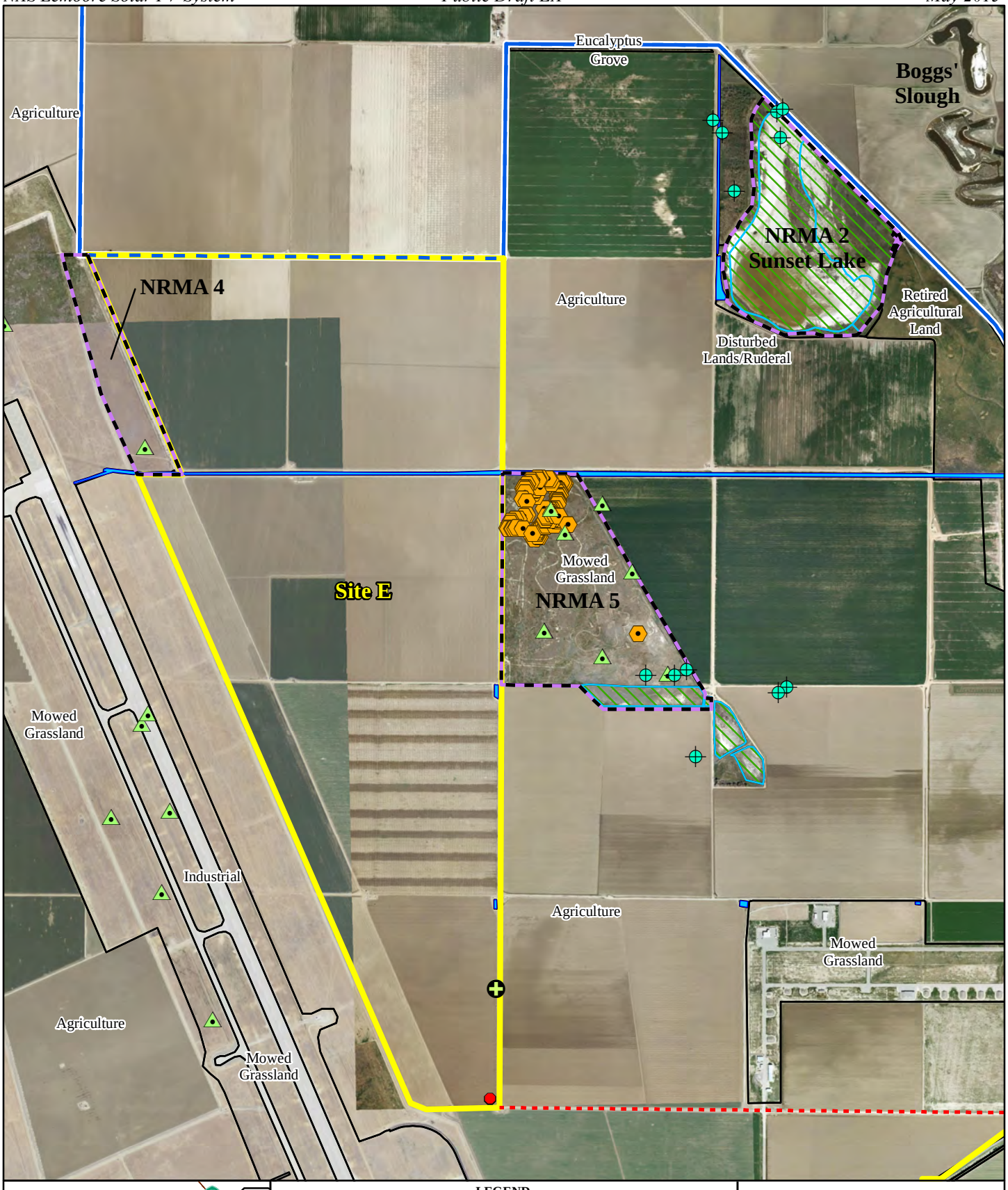

Figure 3.2-4
Biological Resources at Site E

3.2.2.2 Wildlife

Wildlife at NAS Lemoore consists of both resident and migrant native and non-native species common to the San Joaquin Valley (NAS Lemoore 2014a). The majority of non-developed land at NAS Lemoore is currently active or fallow agricultural land that does not provide suitable habitat for the majority of wildlife species that occur in the San Joaquin Valley. All other Navy property outside of NAS Lemoore's Administration and Operations Areas consists of multiple NRMAs, portions of which contain remnant native habitats that have been and continue to be managed for the benefit of wildlife and native plant communities (NAS Lemoore 2014a).

Although no NRMAs occur within the proposed solar PV system sites, NRMAs 4 and 5 directly abut Site E (see Figure 3.2-4). NRMA 4 is approximately 50 acres (20 hectares) of annual grassland habitat located in the northern part of NAS Lemoore. NRMA 5 is approximately 116 acres (47 hectares) of annual grassland and brushland habitat managed for the federally listed San Joaquin kangaroo rat (*Dipodomys nitratoides*) (see Section 3.2.2.3) in the northeastern part of NAS Lemoore.

Five species of amphibian and seven species of reptile are known to occur at NAS Lemoore (NAS Lemoore 2014a). Common amphibian and reptile species known to occur at NAS Lemoore include the non-native American bullfrog (*Lithobates catesbeianus*), Sierran treefrog (*Pseudacris sierra*), California toad (*Anaxyrus boreas halophilus*), San Joaquin fence lizard (*Sceloporus occidentalis biseriatus*), and western side-blotched lizard (*Uta stansburiana elegans*). The potential solar PV system sites lack suitable burrowing and reproductive habitat for amphibians and reptiles; however, these animals could use the project area for overland movement and/or dispersal.

Annually, NAS Lemoore provides nesting, roosting, and foraging habitat for approximately 170 species of birds, 54 of which are likely resident species (NAS Lemoore 2014a). Resident bird species that are known to breed at NAS Lemoore include Swainson's hawk (*Buteo swainsoni*), great-horned owl (*Bubo virginianus*), house sparrow (*Passer domesticus*), and burrowing owl (*Athene cunicularia*) (NAS Lemoore 2014a). Migratory bird species use NAS Lemoore habitat as a stop-over during their annual migrations. Suitable areas for resting and foraging on the Station include NRMA 2 (Sunset Lake) and the wastewater treatment facility evaporation ponds to the south of NAS Lemoore. NAS Lemoore receives a number of migrating species such as American white pelican (*Pelecanus erythrorhynchos*), white-crowned sparrow (*Zonotrichia leucophrys*), yellow-rumped warbler (*Dendroica coronata*), white-faced ibis (*Plegadis chihi*), and short-eared owl (*Asio flammeus*).

Twenty-eight mammal species have been observed at NAS Lemoore, including seven species of bats (NAS Lemoore 2014a). Mammals common to NAS Lemoore include black-tailed jackrabbit (*Lepus californicus*), Botta's pocket gopher (*Thomomys bottae*), desert cottontail (*Sylvilagus audubonii*), deer mouse (*Peromyscus maniculatus*), California ground squirrel (*Spermophilus beecheyi*), raccoon (*Didelphis virginiana*), and coyote (*Canis latrans*).

Agricultural parcels on NAS Lemoore do not provide suitable habitat for most of the species that occur in the region. However, game birds, such as mourning dove (*Zenaida macroura*) and ring-necked pheasant (*Phasianus colchicus*), and a variety of other birds, including red-winged blackbird (*Agelaius phoeniceus*), yellow-headed blackbird (*Xanthocephalus xanthocephalus*), great egret (*Ardea alba*), burrowing owl, peregrine falcon (*Falco peregrinus*), white-faced ibis, and long-billed curlew (*Numenius americanus*) are known to utilize the agricultural parcels (Lang 2012; Tierra Data, Inc. 2012). Raptors, including hawks and owls, have also been observed foraging in the agricultural areas at NAS Lemoore. Some limited populations of reptiles and amphibians occur in agricultural lands, including the western whiptail (*Cnemidophorus tigris*), San Joaquin fence lizard, western side-blotched lizard, and Pacific

gopher snake (*Pituophis catenifer catenifer*). Mammal species include house mouse (*Mus musculus*) and coyote (*Canis latrans*). Reptiles, amphibians, and mammals found here include those associated with the disturbed grassland but at much lower population levels. They are also likely inhabited by various invertebrate species regardless of the crop, which may provide a food source for wildlife (NAS Lemoore 2014a).

3.2.2.3 Special Status Species

Federally Listed Species

Federally listed wildlife species that potentially occur at NAS Lemoore are shown in Table 3.2-1. No federally listed plant species are known to occur on NAS Lemoore.

Table 3.2-1. Federally Listed Species with the Potential to Occur at NAS Lemoore

Common Name	Scientific Name	Federal/State Status	Occurrence at NAS Lemoore	Occurrence in Potential Solar PV System Sites
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	T/-	Potential to Occur	Not likely, as no elderberry occurs within the project area.
California tiger salamander	*Ambystoma californiense*	T/T	Potential to Occur	Not likely. If present near project area, occurrence would be limited to overland travel by dispersing individuals.
Blunt-nosed leopard lizard	*Gambelia sila*	E/E	Potential to Occur	Not Likely
California least tern	*Sternula antillarum browni*	E/E	Non-breeding transient. Observed at the wastewater treatment facility evaporation ponds in the southeastern portion of the Station.	Not Likely. Could potentially fly over solar PV system sites.
San Joaquin kangaroo rat	*Dipodomys nitratoides*	E/E	Only known to occur in Natural Resources Management Area 5	Not likely. If present near project area, occurrence would be limited to overland travel by dispersing individuals.
Buena Vista Lake shrew	*Sorex ornatus relictus*	E/-	Potential to Occur	Not likely. If present near project area, occurrence would be limited to overland travel by dispersing individuals.
San Joaquin kit fox	*Vulpes macrotis mutica*	E/T	Potential to Occur	No suitable denning or foraging habitat, but would likely use solar PV system sites for overland movement. No observations on NAS Lemoore since 1975.

Sources: California Natural Diversity Database 2015; NAS Lemoore 2014a; NAVFAC SW 2015b; USFWS 2015.
Notes: E = Endangered; T = Threatened.

A habitat assessment was completed in the potential solar PV system sites in December 2014 to analyze the habitat potential and potential for occurrence for the following federally listed species: California tiger salamander, blunt-nosed leopard lizard, San Joaquin kangaroo rat, Buena Vista Lake shrew, and San Joaquin kit fox. The assessment found that due to the lack of suitable habitat, the proposed solar PV system sites do not provide suitable occupation or breeding habitats for the target sensitive species beyond overland dispersal or movement (NAVFAC SW 2015b).

All the proposed solar PV system sites are composed of recently fallow, tilled agricultural land, devoid of vegetation and burrows. The proposed switchyard is composed of an area of densely vegetated exotic grasses and forbs, with a heavily disturbed portion that is devoid of vegetation. No burrows of any kind were observed within the proposed switchyard. For complete descriptions of federally listed species with

the potential to occur at NAS Lemoore, refer to the Habitat Assessment Report conducted for the Proposed Action (NAVFAC SW 2015b). While no federally listed species are considered likely to occur in the project area, those federally listed species with the highest potential to occur in the vicinity of the project area are described below.

San Joaquin Kit Fox

The current distribution of San Joaquin kit fox is limited to suitable habitat in the San Joaquin Valley floor and in the surrounding foothills of the coastal ranges, Sierra Nevada, and Tehachapi Mountains. The species usually occupies areas with loose-textured soils (Morrell 1972), where the San Joaquin kit fox uses dens for shelter and protection. San Joaquin kit foxes inhabit annual grasslands, sparsely vegetated shrubby habitats, and some agricultural and urban areas (Morrell 1972). Kit foxes are primarily nocturnal and active year-round. Dens are typically located in flat terrain but can also be found within washes, drainages, and roadside berms. Although San Joaquin kit foxes construct their own dens, they also enlarge or modify burrows constructed by other animals, such as ground squirrels, badgers (*Taxidea taxus*), and coyotes (California State University Stanislaus 2006). Most dens have at least two entrances and one fox may use several dens, particularly during summer months and pupping season. Mating occurs around January, with pups born during late February and early March.

The California Natural Diversity Database (2015) reports six records of San Joaquin kit fox observations on NAS Lemoore, all within the agricultural areas. All six of the observations date from 1975. Within the proposed solar PV system sites and switching station, there is no habitat suitable for kit fox denning or foraging, because the entirety of the area proposed for project use falls within actively managed agricultural land devoid of vegetation or burrows (NAVFAC SW 2015b). However, San Joaquin kit fox could potentially use the proposed solar PV system sites for overland movement. No sign or evidence of San Joaquin kit fox was observed during the habitat assessment surveys (NAVFAC SW 2015b).

San Joaquin Kangaroo Rat

There is uncertainty regarding the subspecies status of the San Joaquin kangaroo rat population at NAS Lemoore, which is located just south of the Kings River, the historic southern boundary for the Fresno kangaroo rat (*Dipodomys nitratoides exilis*). The NAS Lemoore population could be Tipton kangaroo rat (*D. nitratoides nitratoides*), Fresno kangaroo rat, or an intergrade between the two subspecies (U.S. Fish and Wildlife Service [USFWS] 2010a, b). Both subspecies shelter in ground burrows, dug by themselves or by other kangaroo rats.

There are no known surviving populations of Fresno kangaroo rat, with the last capture occurring at the Alkali Sink Ecological Reserve in 1992 (USFWS 2010a). Historically, the Fresno kangaroo rat occurred within alkali-sink scrub and arid grasslands of the San Joaquin Valley Floor between Madera in Merced County to the north, and the Kings River to the south. While not currently confirmed as extinct, some populations may be yet undiscovered.

The Tipton kangaroo rat occurs within valley saltbush scrub and valley sink scrub communities. They occupy level terrains to nearly level terrains within alluvial fan and floodplain soils ranging from fine sands to clay-sized particles with high salinity. Tipton kangaroo rats are known to occur in grasslands with little to no woody shrubs. However, sparse-to-moderate shrub cover is associated with high-density populations (USFWS 2010b). Current distribution of Tipton kangaroo rat is limited to 10 major sites including NAS Lemoore (USFWS 2010b).

Within the project area, there is no habitat suitable for San Joaquin kangaroo rat occupancy, because the entirety of the area proposed for project use falls within actively managed agricultural land devoid of

vegetation or burrows. Two areas that have the potential to support San Joaquin kangaroo rat were identified in the vicinity of the proposed solar PV system sites (NAVFAC SW 2015b).

- NRMA 4 is sparsely vegetated with Russian thistle (*Salsola tragus*) and narrow-leaved milkweed (*Asclepias fascicularis*), with annual grasses in the herbaceous layer. Abundant small mammal burrows consistent with use by California ground squirrels were noted within the area. In 1982, an unidentified kangaroo rat was observed in NRMA 4. Studies completed in 1993, 1998–1999, 2001, 2003, and 2004 resulted in no kangaroo rat detections in NRMA 4 (NAS Lemoore 2014a). The species may no longer exist at NRMA 4 (NAS Lemoore 2014a). NRMA 4 is located adjacent to Site E, approximately 2 miles (3.2 kilometers) from Sites B and D, and approximately 6 miles (9.6 kilometers) from Site A.
- NRMA 5 provides suitable San Joaquin kangaroo rat habitat. NRMA 5 contains all the elements considered essential to the species, namely, sufficient vegetation cover to escape from predators as well as provide a food source; land surface with hummocks to serve as burrowing sites; and soil of appropriate compactness to allow burrow construction (NAVFAC SW 2015b). San Joaquin kangaroo rats were documented within NRMA 5 as recently as 2011 (NAS Lemoore 2014a). A population of the species likely currently occupies NRMA 5. NRMA 5 is located adjacent to Site E, approximately 1 mile (1.6 kilometers) from Site B, approximately 2 miles (3.2 kilometers) from Site D, and approximately 6 miles (9.6 kilometers) from Site A.

Other Special Status Species

Other special status species potentially affected by the Proposed Action are listed in Table 3.2-2. For full species descriptions and potential occurrences at NAS Lemoore, refer to NAS Lemoore (2014a).

Table 3.2-2. Other Special Status Species with the Potential to Occur in the Project Area

Common Name	Scientific Name	USFWS/CDFW Status	Occurrence at NAS Lemoore
Western spadefoot toad	*Spea hammondii*	-/SSC	NRMA 3. Occasional sightings near areas of open or ponded water.
Tricolored blackbird	*Agelaius tricolor*	BCC/SSC	Administration and Housing Area, Operations Area and adjacent agricultural fields.
Burrowing owl	*Athene cunicularia*	BCC/SSC	Natural and mowed grasslands in the Operations Area and NRMAs. Fallow agricultural fields.
Swainson's hawk	*Buteo swainsoni*	BCC/T	Forages over agricultural fields, preying on small mammals. Nests in trees.
Mountain plover	*Charadrius montanus*	BCC/SSC	Operations Area and adjacent agricultural fields.
Snowy plover	*Charadrius nivosus*	BCC/SSC	Evaporation ponds.
Olive-sided flycatcher	*Contopus cooperi*	BCC/SSC	NRMAs.
Willow flycatcher	*Empidonax traillii*	BCC/E	Documented during surveys for the 2001 INRMP. Not observed since.
Peregrine falcon	*Falco peregrinus*	BCC/FP	Foraging in agricultural fields.
Greater sandhill crane	*Grus canadensis tabida*	-/T	Observed flying over the Operations Area.
Loggerhead shrike	*Lanius ludovicianus*	BCC/SSC	Throughout the Station: motocross track, Operations Area, NRMAs, Landfill, Karen Mechem Park, evaporation ponds.
Long-billed curlew	*Numenius americanus*	BCC/WL	NRMAs and agricultural fields.
Western mastiff bat	*Eumops perotis*	-/SSC	Primarily NRMAs.

Table 3.2-2. Other Special Status Species with the Potential to Occur in the Project Area

Common Name	Scientific Name	USFWS/CDFW Status	Occurrence at NAS Lemoore
Western red bat	*Lasiurus blossevillii*	-/SSC	Recorded near agricultural area by a ditch and along a tree-lined canal.
Tulare grasshopper mouse	*Onychomys torridus tularensis*	-/SSC	Documented as present in the 2001 INRMP. Not observed since.
American badger	*Taxidea taxus*	-/SSC	Burrows and tracks in NRMA 1; NRMA 5.

Sources: California Natural Diversity Database 2015; NAS Lemoore 2014a.
Notes: BCC = Bird of Conservation Concern; CDFW = California Department of Fish and Wildlife; E = Endangered; FP = Fully Protected; SSC = Species of Special Concern; T = Threatened; WL = Watch List; - = no status.

3.2.3 ENVIRONMENTAL CONSEQUENCES

3.2.3.1 Alternative 1: Construction, Operation, and Decommissioning of an up to 390 MW Solar PV System at Sites A and B

Sites A and B

Construction

Under Alternative 1, construction activities at Sites A and B would have no impact on native and/or natural plant communities, as all of the potential solar PV system sites are located in active agricultural land. No tree removal would be required for construction of the solar PV system sites; trees associated with windbreaks would not be removed. Therefore, there would be no impacts to native or natural plant communities.

Construction activities at Sites A and B would likely have minimal impacts on wildlife populations. Intensively used agricultural lands on the proposed solar PV system sites are not suitable for most wildlife and the majority of the surrounding lands would continue to be used for agricultural purposes. Wildlife in the vicinity of construction activities would be exposed to auditory and visual disturbance from human presence and construction equipment. However, the potential solar PV system sites are all in heavily used agricultural areas that regularly experience such disturbance from agricultural practices, including the use of pesticides and heavy machinery, and provide relatively little wildlife resources. Use of construction equipment and vehicles could potentially crush and/or injure wildlife, but because of the lack of suitable wildlife habitat in the potential solar PV system sites, the likelihood of such impact is relatively low. Mobile species, such as birds and mammals, would leave the sites during construction and migrate to other more suitable locations.

To avoid impacts to ground-nesting birds, such as burrowing owls and killdeer (*Charadrius vociferus*), a survey for active nests or nesting activity would be conducted before construction should clearing and grubbing occur during the nesting season (typically March 15 to August 31). If the survey finds active nests, then construction personnel would either avoid nests until fledglings have left, or permitted personnel would relocate eggs and chicks following all federal and state regulations and permitting requirements.

Special status wildlife species would be subject to the same impacts described in the above paragraph. It is highly unlikely that any special status species would be present in the potential solar PV system sites during construction activities. To avoid impacts to burrowing owls that may potentially occur and/or nest in the project area, a pre-construction survey would be conducted as described above.

Operation

Following construction and during operation, ground cover and other vegetation beneath and near the panels would be trimmed periodically and likely controlled with herbicides to ensure that vegetation does not obscure or shadow the panels. Because of the historical agricultural use of the potential solar PV system sites, the vegetation requiring mechanical and/or chemical control would primarily be non-native herbaceous species. Therefore, there would be no impacts to native or natural plant communities.

Operation of the solar PV system would not result in a loss of foraging, nesting, or roosting habitat for wildlife, including special status species, as all of the potential solar PV system sites have been intensively used for agricultural purposes and do not currently provide such habitats. Animal burrows, including those used by burrowing owls, do not currently exist in the agricultural parcels because of the regular ground disturbance that occurs. Therefore, there would be no impact to such features.

Chain link fencing around the potential solar PV system sites would present barriers to wildlife overland movement, especially to larger species. It is expected that smaller species, such as small rodents, would be able to fit through the chain link fencing. However, larger animals would likely be able to move around the fences without expending energy to the point of affecting major life functions. In addition, the agricultural fields already present barriers to movement because of their lack of habitat and dense crops. Still, the solar panels themselves and the fencing surrounding the solar PV arrays and stations would alter the local environment to the point that hiding spots, preying strategies, and food availability would likely be changed.

Under Alternative 1, the addition of approximately 2 miles (3.2 kilometers) of new 230-kV overhead transmission line from Site A to the proposed switching station for interconnection to the existing PG&E 230-kV overhead line has the potential to adversely affect bird species, including special status birds. The new line would be used for perching, but would also represent a collision hazard for birds, especially during periods of low visibility. However, overhead transmission lines are already abundant in the vicinity of the project area and are part of the local environment. In addition, all transmission towers, poles, and lines would be designed and constructed in accordance with the guidelines in Avian Power Line Interaction Committee (2006 and 2012), or the most current version of the guidelines available at the time of construction, to minimize collision and electrocution hazards of migratory birds from transmission lines.

Bird and bat mortalities have been documented at utility-scale solar projects in southern California (Kagan et al. 2014; Bureau of Land Management 2014). Three main causes of bird mortality have been documented at solar energy facilities in southern California: impact trauma, solar flux, and predation (Kagan et al. 2014). Solar flux has been identified as a major threat to bird species at solar power towers that use mirrors to focus solar energy to a tower. However, in Kagan et al. (2014), of 61 bird deaths analyzed at a solar PV system, solar flux was not documented as a cause of death in a single case, as solar PV systems do not create temperatures high enough to scorch birds that fly over.

Impact trauma was the leading cause of bird death documented at a single PV site in southern California in 2014 (Kagan et al. 2014). A large proportion of birds killed at utility-scale solar projects die from striking project components because panels are oriented vertically, or, from apparently mistaking the solar PV arrays for water (Kagan et al. 2014). “Lake effect” is commonly used to describe the phenomenon whereby birds and their insect prey can mistake a reflective solar facility for a water body because they share several characteristics, namely large, smooth, dark surfaces that reflect horizontally polarized sunlight and skylight (Upton 2014).

Many insects rely on polarized light as a cue to indicate the presence of lakes and rivers (Horvath et al. 2010). Aggregations of flying insects at solar PV panels likely attract insect-eating birds and/or bats, thereby increasing the likelihood of bird/bat collisions with solar PV panels (Kagan et al. 2014). Although solar PV panels are inherently absorptive (i.e., non-reflective), they do reflect horizontally polarized light similar to the way a lake's smooth, dark surface horizontally polarizes reflected sunlight and skylight. This feature may confuse birds that use polarized light for orientation or behavioral cues (Desert Renewable Energy Conservation Plan Independent Science Advisors 2010). Lake effect seems to be most influential when panels or heliostats are oriented horizontally, collectively forming a smooth, continuous surface (Kagan et al. 2014). Visual cues such as contrasting or ultraviolet-reflective dividing strips placed no farther than 11 inches (28 centimeter) from each other on solar PV panels may break up the reflection and reduce attraction of aquatic invertebrates and insects.

Estimating the number of birds that may be injured or killed due to lake effect from implementation of Alternative 1 is impossible at this time because of the lack of studies on this phenomenon as it relates to solar projects. Under Section 1502.22 of CEQ Regulations for Implementing NEPA, "when an agency is evaluating reasonably foreseeable … adverse effects on the human environment … and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking" (40 CFR § 1502.22). While the collective evidence suggests that lake effect does contribute to avian mortalities on solar PV projects, no scientifically rigorous studies have been conducted to test the validity of this conclusion. However, based on the available data, utility-scale solar power projects have the potential to cause some mortality to birds and bats. Efforts to minimize potential lake effect impacts to birds and bats from the implementation of Alternative 1 can still be achieved by using the best available science and appropriate design specifications during construction.

While acknowledging the incompleteness of the current data on the topic, this analysis concludes that any lake effect-related bird strikes at the proposed solar PV array location(s) would not rise to the level of a significant impact for purposes of NEPA analysis. Therefore, under Alternative 1, no population-level adverse effects to birds or bats as a result of mortalities related to "lake effect" of solar PV panels would occur.

As discussed in Table 3.0-1, quarterly monitoring of the solar PV system sites would be conducted to assess any potential impacts the solar PV array might be having on wildlife and special status species, including visual reconnaissance of dead and/or injured species. The results of the monitoring surveys would be reported to the USFWS and the California Department of Fish and Wildlife (CDFW) for comments and recommendations to minimize impacts from continuing operations.

It is likely that use of the agricultural parcels for solar PV system operation would impart beneficial effects on some wildlife, including certain special status species. In their current state, the agricultural fields are regularly planted with dense crops, the soils are highly disturbed, and little wildlife habitat or potential for wildlife use is available. It is expected that ground- and/or burrow-nesting birds, mammals, and other species would potentially use the solar PV arrays as nesting and/or foraging habitat. Species such as burrowing owl, mountain plover, multiple small mammals, and carnivores such as coyote would likely utilize the relatively open habitat below the solar PV panels more than the active agricultural fields. As discussed in Table 3.0-1, quarterly monitoring of the solar PV sites would be conducted (both day and night surveys) to assess wildlife occurrence and use of the solar PV sites. These data would be shared and coordinated with wildlife hazard management operations already occurring at NAS Lemoore, including Bird Aircraft Strike Hazard (BASH) surveys, wildlife determent, and wildlife relocation/removal from areas in and around the NAS Lemoore airfield (Lang 2012).

Under Alternative 1, the likelihood of impacts to federally listed species would be extremely low because no species or suitable habitat were observed during biological field surveys, nor are they known to occur at the proposed project site (NAVFAC SW 2015b). Quarterly monitoring of the solar PV arrays would be conducted to assess the potential use of the project area by wildlife, including federally listed species. Results of the surveys would be provided to USFWS and CDFW for comments and recommendations to minimize impacts from continuing operations.

Decommissioning

Decommissioning of the solar PV systems would have similar impacts to construction activities. Work crews, vehicles, and equipment would require access to the sites for removal of all solar PV system materials. No native or natural plant communities would be impacted by decommissioning activities, as bare ground and/or non-native herbaceous plants would be the dominant groundcover.

During operation of the solar PV system, certain species may become established in the habitats in and/or adjacent to the project area, including certain special status species, therefore, a biological monitor would survey the solar PV system sites for denning mammals and/or nesting birds before decommissioning activities. If special status nesting or denning animals, including migratory birds, are found to occur in the solar PV system sites, they would be allowed to leave the sites on their own accord or would be passively relocated during the avian non-breeding season (September – February) before the start of decommissioning activities. If federally listed species are found to occur in the solar PV system sites before the start of decommissioning activities, then the USFWS would be notified and no actions would be taken until necessary measures are agreed upon by the Navy, the private partner, and the USFWS.

Summary

The current agricultural parcels provide little benefit to biological resources. Although construction and operation of the solar PV system would not benefit native habitats, Alternative 1 would potentially create more bare ground and sparsely vegetated habitats for foraging and/or ground-nesting wildlife species foraging and/or ground-nesting wildlife species. Sites A and B are located within the potential renewable energy area identified in the INRMP. The environmental protection measures listed in Table 3.0-1 would be implemented to lessen potential impacts to biological resources. Therefore, implementation of Alternative 1 would not have a significant impact to biological resources.

Alternative 1 Option: Construction, Operation, and Decommissioning of a 20 MW Solar PV System at Site A

Under the Alternative 1 Option, impacts to biological resources would be the same as generally described for those associated with Alternative 1, except at a smaller scale. Under the Alternative 1 Option, up to approximately 145 acres (59 hectares) of agricultural land in Site A would be converted to solar PV arrays. All environmental protection measures listed in Table 3.0-1 would be applicable and required under the Alternative 1 Option.

Summary

The current agricultural parcels provide little benefit to biological resources. Although construction and operation of the solar PV system would not benefit native habitats, the Alternative 1 Option would potentially create more bare ground and sparsely vegetated habitats for foraging and/or ground-nesting wildlife species foraging and/or ground-nesting wildlife species. The environmental protection measures listed in Table 3.0-1 would be implemented to lessen potential impacts to biological resources. Therefore, implementation of the Alternative 1 Option would not have a significant impact to biological resources.

3.2.3.2 Alternative 2: Construction, Operation, and Decommissioning of an up to 390 MW Solar PV System at Sites A, B, D, and/or E

Under Alternative 2, impacts to biological resources associated with construction, operation, and decommissioning would be as generally described for those associated with Alternative 1. Potential differences in impacts to biological resources under Alternative 2, as compared to Alternative 1, are described below.

Sites A, B, D, and/or E

Construction

Construction impacts at Sites A and B under Alternative 2 would be identical to those described for Alternative 1.

Construction impacts at Site D, being entirely composed of agricultural parcels and not adjacent to any NRMAs, would be as generally described for Sites A and B under Alternative 1.

Construction impacts at Site E would be similar to those described for Sites A and B under Alternative 1, as Site E is entirely composed of agricultural parcels. However, Site E is immediately adjacent to NRMAs 4 and 5 (see Figure 3.2-4). Although no native habitats would be impacted in NRMAs 4 and 5, there is a higher likelihood of wildlife, including special status species, being impacted by construction and associated auditory and visual disturbances than at the other sites. The San Joaquin kangaroo rat was documented in NRMA 5 as recently as 2011 (NAS Lemoore 2014a), and habitat for the species currently occurs in the NRMA (NAVFAC SW 2015b). Therefore, a population of San Joaquin kangaroo rat likely currently occupies NRMA 5. As Site E is immediately adjacent to NRMA 5, the potential exists for San Joaquin kangaroo rat to use Site E for overland dispersal or movement. However, as there is no suitable habitat, a lack of burrows within Site E, and the species is primarily nocturnal, the species would not be expected to be present during daytime construction activities. To avoid potential impacts to San Joaquin kangaroo rat and other federally listed species, pre-construction focused surveys would occur at Site E, as described in Table 3.0-1.

Operation

Operation impacts at Sites A and B under Alternative 2 would be identical to those described for Alternative 1.

Operation impacts at Site D, being entirely composed of agricultural parcels and removed from any NRMAs, would be as generally described for Sites A and B under Alternative 1.

Operation impacts at Site E would be as generally described for Sites A and B under Alternative 1. However, because Site E is immediately adjacent to NRMAs 4 and 5 (see Figure 3.2-4), there is a higher likelihood of wildlife, including special status species, potentially occurring in the site during the operation phase of the Proposed Action. As described in Table 3.0-1, quarterly monitoring of the solar PV sites would be conducted to analyze the occurrence and/or use by wildlife of the sites. If federally listed species were found to occur in the solar PV system sites during any phase of the project, NAS Lemoore and the private partner would consult with the USFWS to address future management of the solar PV system.

Decommissioning

Decommissioning impacts at Sites A and B under Alternative 2 would be identical to those described for Alternative 1. In addition, decommissioning impacts at Site D would be as generally described for Sites A

and B under Alternative 1, as the site is entirely composed of agricultural parcels and not adjacent to any NRMAs.

Decommissioning impacts at Site E would be as generally described for Sites A and B under Alternative 1. However, because Site E is immediately adjacent to NRMAs 4 and 5 (see Figure 3.2-4), there is a higher likelihood of wildlife, including special status species, potentially occurring in the site during the decommissioning phase of the Proposed Action. As described in Table 3.0-1, the solar PV system sites would be surveyed for wildlife, including special status species, before decommissioning activities. If federally listed species were found to occur in the solar PV system sites, NAS Lemoore and the private partner would consult with the USFWS before decommissioning activities.

Summary

The current agricultural parcels provide little benefit to biological resources. Although construction and operation of the solar PV system would not benefit native habitats, Alternative 2 would potentially create more bare ground and sparsely vegetated habitats for foraging and/or ground-nesting wildlife species. Sites D and E are not located within the potential renewable energy area identified in the INRMP. The environmental protection measures listed in Table 3.0-1 would be implemented to lessen potential impacts to biological resources. Therefore, implementation of Alternative 2 would not have a significant impact to biological resources.

3.2.3.3 No Action Alternative

Under the No Action Alternative, the Navy would not enter into an agreement with a private partner to construct and operate a solar PV system at NAS Lemoore. The Navy would maintain operations at the status quo and continue to use the project area for agricultural purposes. Therefore, the No Action Alternative would not have a significant impact to biological resources.

3.3 PUBLIC HEALTH AND SAFETY

3.3.1 DEFINITION OF RESOURCE

This section includes a description of issues that could potentially affect the safety of residents and employees at the proposed project site. Specifically, public health and safety issues associated with on-going agriculture practices and flight safety.

3.3.2 AFFECTED ENVIRONMENT

3.3.2.1 Flight Safety: Airspace Penetration, Reflectivity, and Interference

Clear Zones (CZs), areas immediately beyond the ends of runways that have the greatest potential for the occurrence of aircraft accidents, should remain undeveloped. The DoD Unified Facilities Code 3-260-01 2008 generally defines the CZ as a graded area extending directly off the end of the runway and the remainder of the CZ as land use control areas. The graded area extends directly off the end of the runway for a distance of 1,000 feet (304.8 meters) and must be clear of all above ground obstructions that an aircraft could encounter in the event of a mishap on departure or arrival. The CZ extends an additional 2,000 feet (609.6 meters) and is trapezoidal in shape for Navy Class B Runways. DoD Instruction 4165.57, *Air Installations Compatible Use Zones* and the Chief of Naval Operation's Air Installations Compatible Use Zones 11010.36C provide detailed land use compatibility guidance within the CZs and strongly recommends restricting land use within the CZ be limited to open lands or agriculture without livestock. A land use such as an energy facility, therefore, must not require extensive and long-duration human habitation in the area, and any facility must not extend upward into the glide slope. In addition, the FAA has established safety requirements for renewable energy projects near public use airports. As

detailed in the FAA *Technical Guidance for Evaluating Selected Solar Technologies on Airports* (2010), proposed projects may be subject to formal FAA review for potential airspace penetration, reflectivity, and communication systems interference. Further, all solar projects at airports must submit a Notice of Proposed Construction Form 7460 under Federal Airspace Regulation Part 77 to the FAA to ensure the project does not penetrate the imaginary surfaces around the airport or cause radar interference or glare (FAA 2010). Figure 2-1 depicts the CZs and APZs for NAS Lemoore.

NAS Lemoore maintains detailed emergency and mishap response plans to react to an aircraft or ground accident, should one occur. These plans assign agency responsibilities and prescribe functional activities necessary to react to major mishaps, whether on or off base. Response would normally occur in two phases. The initial response focuses on rescue, evacuation, fire suppression, safety, elimination of explosive devices, ensuring security of the area, and other actions immediately necessary to prevent loss of life or further property damage. The initial response element usually consists of the Fire Chief, who would normally be the first On-scene Commander, fire-fighting and crash-rescue personnel, medical personnel, security police, and crash-recovery personnel. The second phase is the mishap investigation, which is comprised of an array of organizations whose participation would be governed by the circumstances associated with the mishap and actions required to be performed (DoD 2011a).

A substantial amount of research has recently been conducted on energy technologies and their safety impacts on airports and aviation. All of the proposed NAS Lemoore solar PV system sites present safety and mission compatibility concerns regarding use of solar technologies. As previously mentioned, the placement of solar projects near an airfield must assess three factors: airspace penetration, reflectivity, and interference with communications systems. For airspace penetration, objects or facilities cannot extend into the "imaginary surfaces" that define the navigable airspace. Such surfaces are closest to the ground nearest the runway and become higher with distance. Because solar PV projects, generally, extend only a few feet above the ground, the FAA has concluded that solar PV arrays can be located relatively close to a runway without penetration issues. Denver International, Fresno Yosemite, Bakersfield Meadows Field, and Oakland International all have ground solar panels in proximity to active runways, while numerous other large airports (e.g., San Francisco International, Houston George Bush, and Boston Logan) have roof-mounted systems (FAA 2010).

In the 2011 Airport Cooperative Research Program's *Investigating Safety Impacts of Energy Technologies on Airports and Aviation* (Barrett 2011), FAA tower personnel and airport managers from several airports were interviewed for anecdotal information about reflectivity from operating solar PV systems at airports. Two notable sites are Meadows Field in Bakersfield, California, which hosts an 800 kilowatt solar facility, located approximately 250 feet (61 meters) from the runway taxiway, and Fresno Yosemite International Airport in Fresno, California, where there is a 2 MW facility in the Runway Protection Zone (the civilian equivalent of the military APZ) near the end of one of the runways. The Meadows Field solar project has been in operation since January 2009, whereas Fresno's project has been operational since June 2008. In both cases, the air traffic controllers stated that glare has not affected their operations and they had not received complaints from pilots about glare being a problem (Barrett 2011).

Reflectivity problems preclude the use of several other solar energy technologies at the NAS Lemoore sites. These technologies use mirrors to focus sunlight onto a specified surface and produce substantial reflectivity (up to 90 percent of the sunlight received), thereby, posing a glare hazard that may blind or distract pilots on approach to the runway (FAA 2010). The FAA recommends, therefore, against placing reflective technology (i.e., Concentrated PV Arrays [Fields], Concentrated Solar Power, Parabolic Trough, Linear Fresnel Reflectors and Dish Engine) within airport boundaries. In contrast, the FAA study (2010) notes that solar PV employs glass panels designed for efficiency to maximize absorption and minimize reflection. Solar PV panels consist of dark materials that absorb light, and the protective glass cover is coated with an anti-reflective film (FAA 2010).

Such panels reflect as little as two percent of the incoming sunlight depending on the angle of the sun and as such pose no hazard to aviation. Flat-plate solar PV panels are manufactured to absorb rather than reflect sunlight, and can be placed low to the ground so as not to encroach on airfield operations (Figure 3.3-1). As a result of the FAA evaluation, flat-plate PV comprises the only viable and reasonable technology option for a solar PV system at NAS Lemoore.

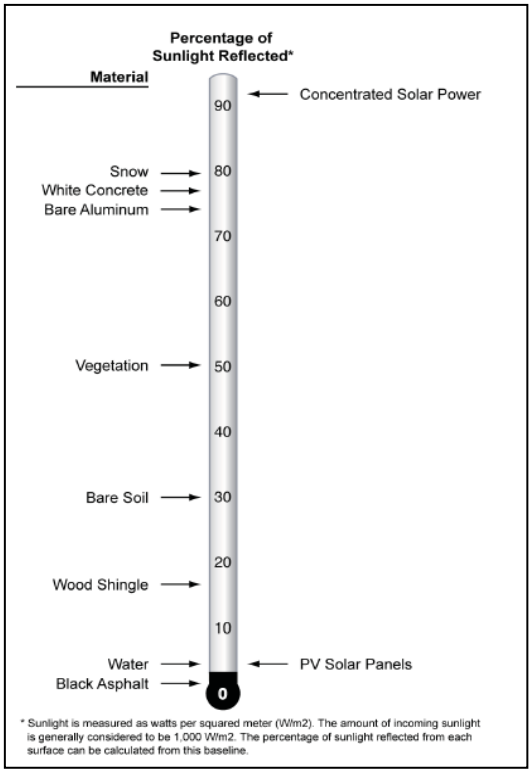

Figure 3.3-1. Reflectivity Scale

With growing numbers of solar energy installations throughout the U.S., glare from solar PV arrays and concentrating solar systems has received increased attention as a real hazard for pilots, air-traffic control personnel, motorists, and others. Together with the FAA, Sandia National Laboratories developed a web-based interactive tool, Solar Glare Hazard Analysis Tool, that provides a quantified assessment of (1) when and where glare would occur throughout the year for a prescribed solar installation, and (2) potential effects on the human eye at locations where glare occurs.

Communications interference can result from solar energy technologies. Potential impacts increase with larger structure size (and cross section) and shorter distance to radar facilities. Transmission lines can also cause interference resulting from electromagnetic signals issuing from the lines. Typically, concern about electromagnetic release is confined to 345 kV or greater lines, with NAS Lemoore proposing less than 345 kV lines.

Communication systems interference includes negative impacts on radar, navigational aids, and infrared instruments. While Global Positioning Systems that communicate with satellites and limit the need for traditional surveillance radar are being employed more widely and are expected to be the fundamental component of future navigational systems, the integrity of traditional radar facilities remains central to the current operational environment (Barrett 2011).

Radar interference can occur when objects are located too close to a radar antenna and reflect or block the transmission of signals between the radar antenna and the receiver. Navigational aids can also be impacted, but they include passive systems with no transmitting signals. Impacts on infrared communications can result because the solar collectors and receivers can retain and emit heat, and the

heat they release can be picked up by infrared communications in aircraft causing an unexpected signal (Barrett 2011).

3.3.2.2 Bird Aircraft Strike Hazard

NAS Lemoore's historical annual reported average of six bird or wildlife strikes is low; however, the volume of air traffic and abundance of birds surrounding the airfield suggest a potential for increased bird strikes (NAS Lemoore 2012a). Recent data from 2014 reveals a total of 37 bird strikes at NAS Lemoore from January to October 2014 (USDA 2014b).

Several bird species represent BASH potential at NAS Lemoore and include European Starlings, blackbirds, Horned Larks, Red-tailed Hawks, Burrowing Owls, Barn Owls, Long-billed Curlews, Mourning Doves, and to a lesser extent, hawks, herons, egrets, sparrows and finches. Coyotes and feral dogs also present a significant risk to flight operations (NAS Lemoore 2012a).

To identify areas of concern and assist in prevention or reduction of aviation hazards from birds and other wildlife, NAS Lemoore has established a Bird Working Group and published a local BASH plan. These BASH procedures involve numerous NAS Lemoore aviation, safety, and environmental personnel and include restrictions when adverse conditions to air operations occur.

3.3.2.3 Agriculture Practices

Sites A, B, D, and E are located on land that has historically been utilized for agriculture. As such, pesticides have been used to control noxious weeds, rodents, insects, and other pests on the sites. The soil quality and pesticide/herbicide application for the agricultural outlease areas have been managed through a Soil and Water Conservation Plan for each individual lease, in accordance with the Soil and Water Resources Conservation Act of 1977. In addition, the NAS Lemoore Integrated Pest Management Plan contains pest management requirements and guidelines for complying with the Federal Insecticide, Fungicide and Rodenticide Act; state and local laws; and DoD and Navy regulations. Current agricultural leases require soil testing every other year, beginning the first year of the lease. Compliance with NAS Lemoore's Soil and Water Conservation Plan and Integrated Pest Management Plan helps maintain soil, water, and air quality by managing pesticide use both in terms of quantity and type of pesticide administered (NAS Lemoore 2014a).

Agricultural practices may also increase exposure risk to coccidioidomycosis, commonly called "Valley Fever." Valley Fever is a non-communicable fungal infection that commonly results from the inhalation of soil-dwelling spores. The fungus is commonly found in semi-arid areas of California, Arizona, New Mexico, Nevada, and Texas. The San Joaquin Valley and southern Arizona have the highest levels of fungal spores in the United States. Valley Fever can be a severe illness and result in disability due to pulmonary involvement and disseminated disease; however, most (60 percent) infections are asymptomatic. Symptomatic cases present with flu-like symptoms, and an individual is generally immune to subsequent infections after recovery (Das et al. 2012).

Valley fever diagnosis in the San Joaquin Valley and at NAS Lemoore appears to vary seasonally, with the highest incidence being in December and January, and the lowest in August and September. The seasonality reflects the spores favoring rainfall after drought, followed by dry, windy weather conditions (Lee and Crum-Cianflone 2008). While there is association between infection and drought and rainfall patterns, soil-disrupting activity, such as digging in areas populated by spores, is the most important determinant of Valley Fever incidence in California. This is reflected when looking at the activities most susceptible to infections, notably mining, agriculture, and construction (Das et al. 2012).

Between 2002 and 2006, the number of patients diagnosed with Valley Fever at the NAS Lemoore Hospital rose from 4 in 2002 to 27 in 2006; the total number of cases for the period was 82. Twenty percent of those infected required hospitalization. The Kings County Public Health Department reports similar increasing trends in the local civilian population (Lee and Crum-Cianflone 2008).

Exposure risk reduction requires a multi-faceted approach. Personal protective equipment, including respirators, is recommended. However, Das et al. recognize that this is not only among the least effective measures for preventing exposure, it is also often unreasonable to use in general construction. Instead, dust abatement measures, including soil wetting, combined with policy changes such as not performing construction activities on dry, windy days is recommended. Cleaning of equipment and vehicles before leaving the construction site is recommended to minimize exposure through resuspended dust (Das et al. 2012).

3.3.2.4 Surface Danger Zones

All outdoor firing ranges must maintain buffers called Surface Danger Zones (SDZs) around their perimeters to minimize the threat from projectile and fragment ricochets to surrounding land uses. Land uses within the SDZ are restricted to protect Navy personnel as well as the public. SDZs associated with two currently inactive skeet ranges are located in the southwest portion of Site B; an SDZ associated with a rifle range occurs in the southern portion of Site E; and two SDZs associated with two shotgun ranges are located to the south of Site E (Figure 3.3-2) (NAS Lemoore 2014a).

3.3.3 ENVIRONMENTAL CONSEQUENCES

3.3.3.1 Alternative 1: Construction, Operation, and Decommissioning of an up to 390 MW Solar PV System at Sites A and B

Sites A and B

Construction

The construction contractor would develop a health and safety plan consistent with Occupational Safety and Health Administration standards and regulations to limit risk to workers during construction. The plans and procedures would specifically outline safety measures related to solar PV systems, overhead utility lines, and aircraft operations. The health and safety plan would evaluate potential exposures by operators and construction workers to the chemicals of potential concern (i.e., organochlorine pesticides), as well as to minimize Valley Fever exposure risk. As discussed in Section 3.7.2, the project area is in non-attainment for particulate matter, and therefore dust abatement is required for all activities within the air basin. These measures would also serve to reduce Valley Fever exposure risk.

The solar PV system would be compatible with NAS Lemoore's mission and be below the 150-foot (45-meter) airfield height restriction (i.e., imaginary surface restriction).

Construction activities that have a potential to generate substantial amounts of dust (e.g., initial site grading) would be first coordinated and scheduled with NAS Lemoore Operations to avoid potential impacts to aviation training.

SDZs associated with the currently inactive skeet ranges overlap a portion of Site B; if the skeet ranges are activated, the skeet ranges would be temporarily shut down during construction activities in Site B to avoid potential impacts to worker safety.

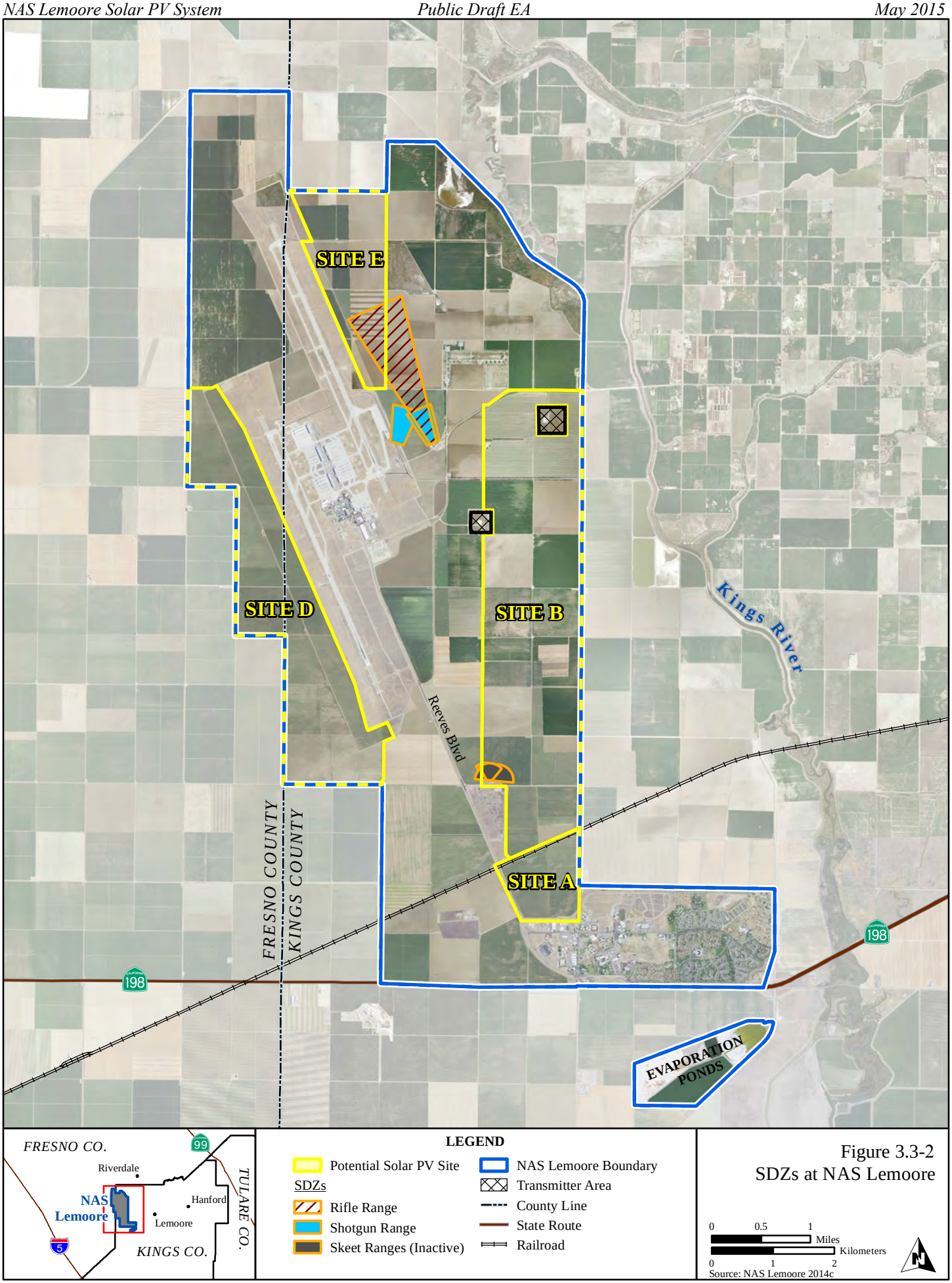

Figure 3.3-2
SDZs at NAS Lemoore

Operation

Airspace Penetration, Reflectivity, and Interference

Alternative 1 would result in the placement of solar PV panels at Sites A and B, which are located east and southeast of both active NAS Lemoore runways (see Figure 2-1). As previously mentioned, the FAA requires assessment of three factors for solar projects near airports: airspace penetration, reflectivity, and interference with communications systems (FAA 2010). Considering these factors and the proximity of the NAS Lemoore runways, the flat-plate solar PV array technology is compatible for use at Alternative 1.

The FAA has concluded that solar PV panels can lie relatively close to a runway without penetration issues due to solar PV configuration options that extend only a few feet above the ground. Upon completion, the highest point of the solar PV array at Sites A and B would be no higher than approximately 15 feet (5 meters) above the ground surface. Panels nearest the runway may be pitched close to flat to help prevent impingement of airspace. Placement of new transmission lines on tall steel or wooden poles from Sites A and B to the existing PG&E 230-kV transmission lines would lie outside the CZ and APZs of both runways and would not penetrate the airfield airspace or increase the minimum obstacle clearance altitude.

The FAA study (2010) noted that solar PV systems employ glass panels designed for efficiency to maximize absorption and minimize reflection. Solar PV panels consist of dark materials that absorb light, and the protective glass cover is coated with an anti-reflective film. Such panels reflect as little as 2 percent of the incoming sunlight depending on the angle of the sun and as such, pose no hazard to aviation.

In addition, as determined in a recent technical notification completed by SunPower (SunPower Corporation 2010), glare and reflectance levels from solar PV systems are described as follows.

The glare and reflectance levels from a given solar PV system are decisively lower than the glare and reflectance generated by the standard glass and other common reflective surfaces in the environments surrounding the given solar PV system. Concerning random glare and reflectance observed from the air, SunPower has several large projects installed near airports or on Air Force bases. Each of these large projects has passed FAA or Air Force standards and all projects have been determined as "No Hazard to Air Navigation."

The location of the air traffic control tower is north of Site A and most of Site B (see Figure 2-1) and with solar PV panels facing south for optimum sun exposure, glare from the panels in the tower should be minimal. If a tracking array system (single-axis) is used, glare from the northernmost panels at Site B could affect Runway 14L operations in the afternoon.

Physical methods may also be taken to reduce reflection from panels and the associated glare and glint, including the application of antireflective coatings and/or texturing to the panels. A roughened surface would prevent specular reflection, which can produce a sharper and more concentrated ray of light, and instead produce a diffuse reflection. Neither has discernable effects on system performance but could help minimize reflection (Kandt 2014).

In their study, the FAA also concluded that due to their low profiles, solar PV systems present minimal risk of interfering with radar transmissions (FAA 2010). Electromagnetic wave emissions from solar panels do not extend over distances sufficient to interfere with radar signal transmissions. Similarly, in the

Airport Cooperative Research Program's investigation of communications systems inference, electrical interference has not been a concern found by the FAA during airspace reviews (Barrett 2011).

Solar PV projects at Palmdale and Blythe submitted information to the California Energy Commission on electromagnetic frequencies that would be emitted by electrical equipment associated with their projects—both very close to aviation facilities. The base frequency from Blythe is 60 hertz, while the Air Force in Palmdale employs 108-135 megahertz for very high frequency and 225-400 megahertz for ultra-high frequency (Barrett 2011). Potential interference could also be precluded with building setbacks of 250 or 500 feet (76.2 or 152.4 meters) acting as a protective buffer from primary radar systems.

Bird Aircraft Strike Hazard

With the recent increase of solar PV arrays, particularly near airfields, little data exist on BASH potential with regard to solar PV arrays. However, a recent landmark research paper compared bird use of solar PV arrays to that of nearby airfield grasslands to determine whether solar PV arrays receive greater use by birds and thereby, adversely affecting aviation safety (DeVault et al. 2013). The year-long study considered 5 U.S. locations where solar PV arrays were close to airfields: 1 in western Ohio, 2 in the high plains of Colorado, and 2 in the Arizona mountains. Each location consisted of an airfield–solar PV array pair, for a total of 10 study sites.

The results from 1,402 bird surveys suggest that converting airport grasslands to solar PV arrays would not increase hazards associated with bird-aircraft collisions. Fewer bird species were observed in solar PV arrays than in airfields, and overall the level of bird use observed at solar PV arrays was low (DeVault, et al. 2013). Some small birds used solar PV arrays in the summer, and to a lesser degree in spring, for shade and perches. Because perches and shade can influence local bird abundance, biologists and other NAS Lemoore Bird Working Group individuals charged with wildlife management at the airfield should monitor bird activity at solar PV arrays at times when shade and perches are most important to birds. Strategies can also be taken to minimize the potential for birds being drawn to the solar PV system for perching or sheltering. These could include the use of spikes or other such systems on top of each panel to limit the ability of birds to perch, and potential closures or structures behind panels to alleviate the ability of birds or wildlife to shelter there.

Bird use of solar PV arrays has been documented; however, the overall level of bird use of solar PV arrays is lower than in native habitats (DeVault et al. 2013). In addition, Devault et al. (2013) found that small bird species (i.e., songbirds) were more likely to occur in solar PV arrays, either perched or under panels, than were larger species, such as waterfowl. As songbirds do not necessarily pose a significant threat to BASH (Devault et al. 2013), it is not likely that solar PV arrays would increase the risk of a damaging bird strike at NAS Lemoore. Likewise, bird species that tend to form large flocks in agricultural habitats and that also pose a substantial BASH risk, such as European starling (*Sturnus vulgaris*) and blackbirds (Barras et al. 2009), would likely not utilize the solar PV arrays as frequently as the current agricultural fields, thereby reducing BASH risk.

The surveys also showed little evidence that birds responded to polarized light reflected by the solar PV panels or by increased abundance or availability of insects attracted to the panels. No bird causalities were observed caused by stranding or collision with panels, and birds were rarely observed foraging on or near solar PV arrays. While solar PV arrays were not devoid of birds, observations indicated that solar PV arrays would likely not increase the risk of a damaging bird strikes at most locations (DeVault, et. al. 2013). Although birds might be present in solar PV arrays, they do not present risk to aircraft when they are perched- either on, or under the panels. The conversion of airfield habitat to solar PV arrays in some locations could decrease bird-strike risk relative to current grass or other natural land covers used on

airports (DeVault, et al. 2013). Further discussion of potential solar PV system impacts to wildlife are in Section 3.2, *Biological Resources*.

Personnel Safety

The potential solar PV arrays would be fenced off to minimize the potential for unauthorized access. Ground cover and periodic water spraying of the sites would combine to minimize dust generation within the project area, and thus reduce the potential Valley Fever exposure risk to workers performing maintenance. Maintenance activities in Site B would be scheduled to avoid skeet range activities (if the ranges are activated) to avoid potential impacts to worker safety.

Decommissioning

Similar to the construction phase, the decommissioning of the solar project at any of the NAS Lemoore alternative sites would adhere to all applicable Occupational Safety and Health Administration and Navy Occupational Safety and Health rules and regulations, as well as avoid active runways and taxiways, to the extent possible. Removal of solar PV panels and transmission poles would not present any flight safety or public health and safety concern at NAS Lemoore. SDZs associated with the currently inactive skeet ranges overlap a portion of Site B; if the skeet ranges are activated, the skeet ranges would be temporarily shut down during decommissioning activities in Site B to avoid potential impacts to worker safety.

Summary

Due to the lack of airspace penetration, reflectivity, and non-interference with communications from Sites A and B, and no evidence that solar PV arrays would increase bird activity, no significant impacts on flight safety during construction or operation of the solar PV panels would be expected from implementation of Alternative 1. However, there would be the potential for glare from the northernmost panels at Site B to affect Runway 14L operations in the afternoon. Construction, maintenance, and decommissioning activities would be conducted in compliance with health and safety regulations and would not pose a risk to construction personnel or on-going training. Construction, operation, and decommissioning activities would be deconflicted with skeet range activities, should the skeet ranges be activated. Therefore, implementation of Alternative 1 would not have a significant impact to public health and safety.

Alternative 1 Option: Construction, Operation, and Decommissioning of a 20 MW Solar PV System at Site A

Under the Alternative 1 Option, public health and safety impacts would be the same as those discussed under Alternative 1; however, with the elimination of Site B, the associated potential effect to afternoon operations at Runway 14L would not occur. Therefore, implementation of the Alternative 1 Option would not have a significant impact to public health and safety.

3.3.3.2 Alternative 2: Construction, Operation, and Decommissioning of an up to 390 MW Solar PV System at Sites A, B, D, and/or E

Sites A, B, D, and/or E

Construction and Decommissioning

Construction and decommissioning impacts to public health and safety for Alternative 2 would be the same as those discussed for Alternative 1. In addition, a SDZ associated with the rifle range overlaps a

portion of Site E; during construction and decommissioning of the solar PV system in Site E, the rifle range would be shutdown to avoid potential impacts to worker safety.

Operation

Impacts to public health and safety from solar PV system operations for Alternative 2 are comparable to those discussed for Alternative 1. However, the addition of Sites D and E requires further analysis on three points.

The proposed solar PV system at Site D abuts Runway 32L, the CZ, and a portion of APZ-1 (see Figure 2-4). Alternative 2 would construct a 250 MVA substation at the southeast corner of the site and connect, via an underground transmission line through APZ-1 to avoid existing flight easements and compliance issues with DoD Instruction 4165.57. Similarly, at Site E, the proposed 230-kV electrical transmission line would cross a portion of APZ-2. If Site E is developed, the portions of the transmission line that would encroach APZ-2 would be underground to avoid flight easements and compliance concerns with DoD Instruction 4165.57. The DoD Instruction specifies that no high-voltage aboveground power transmission or distribution lines should occur within APZs (DoD 2011b).

The location of the air traffic control tower is south of all of Site E and almost half of Site D (see Figure 2-1). With solar PV panels facing south for optimum sun exposure, there is potential for glare from the solar PV arrays in the control tower. If a tracking system (single-axis) is used, glare from the panels at both sites would be reduced.

Maintenance activities within Site E would be scheduled to avoid rifle range training to avoid impacts to worker safety.

Summary

Construction and decommissioning activities would be conducted in compliance with health and safety regulations and would not pose a risk to construction personnel or on-going training. Operation of the solar PV system sites at Site D or E, would require additional measures (as compared to Alternative 1) to reduce potential glare impacts to operations. Construction, operation, and decommissioning activities in Sites B and E would be deconflicted with firing range activities. Therefore, implementation of Alternative 2 would not have a significant impact to public health and safety.

3.3.3.3 No Action Alternative

Under the No Action Alternative, NAS Lemoore would not develop a solar PV energy project. There would be no construction of a solar PV system at any of the alternative locations. Therefore, implementation of the No Action Alternative would not have a significant impact to public health and safety.

3.4 SOCIOECONOMICS

3.4.1 DEFINITION OF RESOURCE

Socioeconomics describes the basic attributes and resources associated with the human environment, particularly population, employment, income, and housing. The affected area for socioeconomics is defined as the area where principal effects arising from the potential solar PV system construction. In addition, water rights are discussed in this section. Economic impacts are defined to include direct effects, such as changes to lease fees, community agricultural output, and expenditures that affect the flow of dollars into the local economy and secondary effects, which result from the "ripple effect" of spending and re-spending in response to the direct effects.

3.4.2 AFFECTED ENVIRONMENT

The affected area for socioeconomics is defined as the area where principal effects arising from the potential solar PV system construction, specifically, Kings County and Fresno County. The Proposed Action has the potential to result in socioeconomic impacts through changes in employment, agricultural opportunity, irrigation, and construction expenditures.

3.4.2.1 Economics

The most current employment by industry data maintained by the California Employment Development Department (EDD) is from 2011. Based on those data, agriculture accounts for 15.9 percent of Kings County employment and 13.5 percent of Fresno County employment. Manufacturing accounts for 8.3 percent and 7.7 percent of employment in King and Fresno counties, respectively. Utilities employment is combined with trade and transportation jobs, and accounts for 12.6 percent and 16.7 percent of employment in King and Fresno counties, respectively (California EDD 2011). The total agricultural employment for the entire San Joaquin Valley (including [parts of] Alpine, Amador, Calaveras, Fresno, Inyo, Kern, Kings, Madera, Mariposa, Merced, Mono, San Joaquin, Stanislaus, Tulare, Tuolumne counties) in 2014 ranged from a low of 168,200 in March to a high of 239,000 in August. The average for 2014 was 206,308 jobs (California EDD 2015).

The U.S. Environmental Protection Agency (USEPA) estimates that across the US there is one worker per every 740 acres (299 hectares) of farmland (USEPA 2013). At a local level, Kings County has a total of 6,300 workers employed by farms with a total of 822,143 acres (332,711 hectares) of farmland (Caltrans 2013b; California Department of Conservation 2012). This equates to approximately one worker for every 130 acres (53 hectares) of farmland. This ratio of one worker per 130 acres (53 hectares) has been used in this EA.

The Navy and Marine Corps operate an Outlease Program, which extends leases to the public using a sealed bid process. NAS Lemoore dominates the Navy and Marine Corps Outlease Program with 16 farming entities, on average, leasing approximately 54 agricultural outleases on 12,776 acres (5,170 hectares). Revenues generated through the program at NAS Lemoore (estimated to be $1.3 million per year) are used to fund natural resources management programs while the outleases provide farming entities additional land to perform agricultural activities that increase employment and generating revenue. In addition to the direct lease revenue, the NAS Lemoore Outlease Program results in services and land improvements valued at over $1 million dollars per year, which is an estimated combined value of approximately $180 per acre (NAS Lemoore 2014a). Table 3.4-1 estimates the annual value of each site within the Project Area based on the $180 per acre approximation.

Table 3.4-1. Potential Estimated Annual Value of Sites within the Project Area

Site	Agricultural Lease Number	Site Size (acres [hectares])	Estimated Value
A	27, 28	366 (148)	$65,880
B	29, 30 (partial), 31, 33, 34, 36, 37, 40, 41, 44, 45, 47, 48, 51, 52	2,764 (1,118)	$497,520
D	10, 11, 12, 14, 15, 16, 61	1,808 (732)	$325,440
E	13, 54, 57, 62	790 (320)	$142,200

As of 2011, the length of leases varied between 5 and 9 years. As part of the lease agreements, lessees are required to comply with conservation and maintenance measures including irrigation water management, ditch and drainage system maintenance, pest management, road damage prevention and maintenance, erosion, dust, fire, and weed control, debris removal, and other conditions specific to each lease.

The majority of the parcels in NAS Lemoore's Agricultural Outlease Program currently do not have any cropping restrictions and the crops grown are determined by the lessee. With the exception of restricting long-term crops such as grapes and orchards, NAS Lemoore does not dictate which crops to be grown, but rather gives as much flexibility to the lessee as possible to foster economic viability of the leases. Historically, cotton has been the favored crop grown at NAS Lemoore. Other primary crops include wheat, tomatoes, and alfalfa, while sugar beets, corn, garlic, onions, lettuce, garbanzo beans, and safflower are also commonly cultivated. In more recent years, NAS Lemoore has seen significant conversion to vegetable crops, primarily tomatoes, garbanzo beans, onions, and garlic. Sensitive sections of the leases do include cropping restrictions as specified in the Soil and Water Conservation Plan designed to minimize BASH risk (NAS Lemoore 2014a).

According to the 2012 Census of Agriculture, Fresno and Kings counties have a combined total annual market value for crops of $4,551,721,000 and a total farm acreage of 2,394,836, for an average market value of crop production of approximately $1,900 per acre. Based on the $1,900 per acre average, Table 3.4-2 estimates the market value of the potential crop production at each potential solar PV system site. Depending on the actual crops planted, as well as the market price for a specific crop, the market value may be higher or lower than the estimates shown here.

Table 3.4-2. Potential Annual Market Value of Crops from Sites within the Project Area

Site	Agricultural Lease Number	Site Size (acres [hectares])	Estimated Value	Percentage of Total Kings and Fresno County Value
A	27, 28	366 (148)	$695,400	0.01
B	29, 30 (partial), 31, 33, 34, 36, 37, 40, 41, 44, 45, 47, 48, 51, 52	2,764 (1,118)	$5,251,600	0.12
D	10, 11, 12, 14, 15, 16, 61	1,808 (732)	$3,435,200	0.07
E	13, 54, 57, 62	790 (320)	$ 1,501,000	0.03

Source: USDA 2012.

3.4.2.2 Water Rights

Water for agricultural purposes is made available from the Westlands Water District (WWD) to the lessees of agricultural lands on NAS Lemoore for irrigation of crops. Agricultural water is delivered to NAS Lemoore by the WWD and is distributed directly to each agricultural parcel via a system of delivery pipelines that extend throughout the agricultural outlease lands. The lessees of the agricultural lands do not own the water rights associated with the WWD allocation, but purchase the water from WWD (NAS Lemoore 2014a).

3.4.3 Environmental Consequences

Socioeconomic impacts, particularly impacts such as those being evaluated in this EA, are often mixed: beneficial impacts may relate to construction jobs, expenditures, tax revenues, etc., and adverse impacts may relate to current agricultural activity that would no longer be able to take place on NAS Lemoore outleases.

3.4.3.1 Alternative 1: Construction, Operation, and Decommissioning of an up to 390 MW Solar PV System at Sites A and B

Sites A and B

Construction

Under Alternative 1, up to approximately 3,130 acres (1,267 hectares) of agricultural lease land would not be renewed for agricultural use. This is a greater acreage than the 2,730 associated with the actual ground disturbance because it is assumed the blocks of agriculture leases will not be subdivided; all leases at Sites A and B would be affected. This would reflect an estimated annual loss in agricultural lease income to NAS Lemoore of up to approximately $318,500. The loss would be greater when land improvement values are considered. This loss of revenue could potentially be completely offset by the lease fee to be paid by the partner to NAS Lemoore for use of the land for the solar PV system. It is also possible that competition for the remaining agricultural leases may increase agricultural outlease revenue on a per-acre basis, as leases are renewed/established. Because Alternative 1 would lead to a reduction in the amount of land available for farming, the implementation of Alternative 1 would eliminate an estimated $5,947,000 in crop value from the local economies of Kings and Fresno counties on an annual basis. This accounts for approximately 0.13 percent of the total combined annual crop value of Kings and Fresno counties.

Using a ratio of one worker per 130 acres (53 hectares), implementation of Alternative 1 would result in the loss of approximately 24 agriculture jobs. Construction would create approximately 300 temporary jobs over the construction period. These jobs would more than offset the loss of agricultural jobs that would result from the termination of the agricultural lease(s).

The change in use from agriculture to a solar PV system would also decrease or eliminate the demand of up to approximately 3,130 acres (1,267 hectares) for irrigation water. NAS Lemoore would either seek cost savings by renegotiating the water lease agreement with the WWD for a lower amount of water, or maintain the agreement as a buffer in dry years to supply the remaining outleases with irrigation water.

Operation

When the proposed solar PV system is operational, the loss of previously agricultural land would minimize many of the services provided by active agricultural use that benefit NAS Lemoore, including dust abatement via soil-stabilizing crops, pest control, drainage maintenance, fire prevention, and road maintenance. The Proposed Action includes the use of ground stabilization materials as well as mowing of vegetation. If the remaining maintenance functions are not part of the negotiated responsibilities of the partner, NAS Lemoore would have to pay to provide these services to protect the safety of the users of the Station.

Alternative 1 would increase the amount of power available to regional users and/or NAS Lemoore. The increase in power supply could serve to buffer users both at NAS Lemoore and those living locally from price fluctuations, providing a potential economic benefit to the region.

Decommissioning

Decommissioning of the solar PV system would result in a similar, temporary increase in employment for the removal and remediation of Sites A and B. The goal of decommissioning would be to return the sites to their "pre-project" condition, that is, suitable for agricultural use. At that time, the sites would return to the Agricultural Outlease Program, subject to the agricultural market and environmental conditions at that time.

Summary

While the implementation of Alternative 1 would result in an adverse impact to socioeconomics resulting from loss in crop production, the loss accounts for only 0.13 percent of the annual market value for crops in Kings and Fresno counties. In addition, benefits associated with construction employment opportunities, and more stable electricity values could potentially offset this impact, as well as the loss of approximately 24 agriculture jobs. Therefore, implementation of Alternative 1 would not have a significant impact to socioeconomic resources.

Alternative 1 Option: Construction, Operation, and Decommissioning of a 20 MW Solar PV System at Site A

Under the Alternative 1 Option, impacts to socioeconomic resources would be less than those discussed under Alternative 1. Specifically, implementation of the Alternative 1 Option (whereby only Site A would be used as part of the Proposed Action) would reduce annual lease revenues by approximately $37,200. This loss could also be offset by lease payments made by the partner. Implementation of the Alternative 1 Option would result in an estimated annual loss in agricultural crop value of $695,400, or approximately 0.01 percent of the total combined annual crop value of Kings and Fresno counties. The Alternative 1 Option would result in the loss of approximately three agriculture jobs and the creation of approximately 100 temporary construction jobs. Therefore, implementation of the Alternative 1 Option would not have a significant impact to socioeconomic resources.

3.4.3.2 Alternative 2: Construction, Operation, and Decommissioning of an up to 390 MW Solar PV System at Sites A, B, D, and/or E

Impacts associated with Alternative 2 would differ from those described for Alternative 1 only in terms of location of the solar PV system. The acreage of land that would be impacted for the solar PV system (2,730 acres [1,104 hectares]) would be the same as Alternative 1; however, the location of the impact would be different (potentially up to four sites for Alternative 2 as opposed to two sites for Alternative 1). Thus, the potential socioeconomic impacts from Alternative 2 would be the same as those described for Alternative 1. Therefore, implementation of Alternative 2 would not have a significant impact to socioeconomic resources.

3.4.3.3 No Action Alternative

Under the No Action Alternative, the NAS Lemoore Agricultural Outlease Program would remain unchanged. Sites A, B, D, and E would all continue to be available for agricultural production. Therefore, the No Action Alternative would not have a significant impact to socioeconomics.

3.5 VISUAL RESOURCES

3.5.1 DEFINITION OF RESOURCE

Visual resources are the natural and man-made features that comprise the visual qualities of a given area, or "viewshed." These features form the overall impression that an observer receives of an area or its landscape character. Topography, water, vegetation, man-made features, and the degree of panoramic views available are examples of visual characteristics of an area.

3.5.2 AFFECTED ENVIRONMENT

3.5.2.1 Sites A, B, D, and E

Sites A, B, D, and E all have similar visual character, generally consisting of agricultural fields (Photo 3.5-1 to Photo 3.5-4). The sites are flat with little topographic relief. The viewsheds from each site are similar, consisting of power lines, dirt access roads, agricultural fields, tree-lined windbreaks, distant mountains, and the NAS Lemoore Operations Area. The Administrative/Housing Areas are visible from Site A. Overall, the visual landscape of the area is rural with vast agricultural fields, roadways, and irrigation ditches dominating the visual setting.

Photo 3.5-1. Southeast corner of Site A, looking northwest. 25th Street and 69-kV electrical transmission lines in the foreground.

Photo 3.5-2. Northeast corner of Site B, looking southwest. NAS Lemoore Operations Area in the background.

Photo 3.5-3. Southeast corner of Site D, looking northwest.

Photo 3.5-4. Southwest corner of Site E, looking northeast. Power lines, windbreaks, and miscellaneous farm buildings are in the background.

3.5.2.2 Potential Solar PV System Support Areas

Equestrian Center

The visual setting of the equestrian center is mainly composed of horse stables, trees, horse pens, and fences.

Transmission Lines and Substations

All of the action alternatives (with the exception of Alternative 1 Option) involve the construction of a potential east-west transmission line along the northern boundary of the Administrative/Housing Area. The area is visible from the Administrative/Housing Area, and nearby roadways and farmlands.

An existing PG&E 230-kV electrical transmission line borders the equestrian center to the east of NAS Lemoore (Photo 3.5-5). The approximately 115-feet (35-meter) tall electrical transmission line is visible for several miles in every direction due to the flat topography and unobstructed viewshed of the area. A 69-kV electrical transmission line runs beside 25th Street, along the eastern edge of Site B (Photo 3.5-6) and through the NAS Administration area. Similar to the previously described electrical transmission line, the transmission line is highly visible due to the unobstructed viewshed.

Photo 3.5-5. Existing PG&E 230-kV electrical transmission line.

Photo 3.5-6. Existing 69-kV electrical transmission line.

3.5.3 ENVIRONMENTAL CONSEQUENCES

3.5.3.1 Alternative 1: Construction, Operation, and Decommissioning of an up to 390 MW Solar PV System at Sites A and B

Sites A and B

Construction

During the estimated 24-month construction phase of the solar PV system, short-term visual impacts from construction would include, but would not be limited to, the staging of construction equipment, vehicles, materials, and workers, and the generation of dust during site grading. Because the area is topographically flat, visual effects from the construction of the solar PV system would be limited to adjacent roadways and parcels. Impacts to the visual environment from construction would be temporary and depend on the viewer's proximity and line-of-sight to Sites A and B.

Operation

The operation of a solar PV system would transform the visual landscape from agricultural land to a utility-scale solar PV system. An aerial perspective of a nearby solar PV system in Kings County within an agricultural landscape is shown in Photo 3.5-7. Upon completion, the highest point of the solar PV array would be no higher than approximately 15 feet (5 meters) above the ground surface. Because the topography of the area is relatively flat, the visual sensitivity of the solar PV system and substation would be minimal as the system would only be viewable from nearby roadways, buildings on NAS Lemoore, and adjacent parcels. The solar PV system would be compatible with NAS Lemoore's visual character (NAS Lemoore 2014b).

Photo 3.5-7. A representative image of a solar PV system within an agricultural landscape.
Source: Business Journal 2014

The solar PV panels would have an anti-reflective coating that would improve light absorption and reduce or eliminate the potential for glint and glare impacts to nearby viewers. Impacts to public health and safety, including impacts to air operations, are located in Section 3.3, *Public Health and Safety*. A switching station covering approximately 0.5 acre (0.2 hectare) would be constructed adjacent to the equestrian center. The switching station would be visible from the center and Avenal Cutoff Road.

To support the proposed solar PV system, a new 230-kV transmission line would be constructed from Sites A and B to the existing PG&E 230-kV transmission line. The new 230-kV transmission line would include approximately fifty-five, 80-foot (24-meter) tall steel poles constructed along the proposed route, adjacent to the northern boundary of the Administrative/Housing Area. Visual sensitivity of the new 230-kV would be limited to those within the Administrative/Housing Area and the proposed 230-kV transmission line would not change the context of the visual environment, as the transmission line would be consistent and comparable to existing nearby electrical infrastructure. The 230-kV transmission line would not substantially obstruct distant views. Post-construction site operations would include, but would not be limited to, use of existing access roads; electrical and mechanical systems; and maintenance and repair – generally activities that would be consistent with on-going activities at NAS Lemoore. Thus, visual impacts from post-construction operational maintenance would be negligible.

Decommissioning

The decommissioning of the solar PV system would return the project area to its pre-project condition. Decommissioning would include limited temporary visual impacts comparable to construction activities. Decommissioning of the solar PV system and associated support areas would include the deconstruction of the 230-kV transmission lines. The visual landscape would return to agricultural land at the future discretion of NAS Lemoore.

Summary

Construction impacts to visual resources would be temporary and limited to viewers from adjacent roadways and agriculture parcels. The solar PV system would be compatible with NAS Lemoore's visual character. Visual sensitivity of the new 230-kV would be limited to those within the Administrative/ Housing Area and would not change the context of the visual environment. Therefore, implementation of Alternative 1 would not have a significant impact to visual resources.

Alternative 1 Option: Construction, Operation, and Decommissioning of a 20 MW Solar PV System at Site A

Under the Alternative 1 Option, visual impacts would be less than those discussed under Alternative 1 due to the action occurring over a smaller area. The Alternative 1 Option (Model 2 and the combination of Models 2 and 3) would also construct a 69-kV transmission line, rather than a 230-kV transmission line adjacent to the housing area. The 69-kV electrical transmission line would be approximately 58-feet (18-meters) tall. Under the Alternative 1 Option with Model 3, the existing NAS Lemoore 69-kV electrical transmission line would be used. No visual impacts from a new transmission line would occur from this Alternative and Model combination. Therefore, implementation of the Alternative 1 Option would not have a significant impact to visual resources.

3.5.3.2 Alternative 2: Construction, Operation, and Decommissioning of an up to 390 MW Solar PV System at Sites A, B, D, and/or E

Sites A, B, C, and/or E

Construction

Under Alternative 2, the construction of a solar PV system would temporarily alter a portion of the existing visual landscape on all or a combination of the proposed sites, which are currently used for agricultural production. Visual impacts from construction would be temporary and be the same as those described under Alternative 1.

Operation

The operation of a solar PV system would transform the visual landscape from agricultural land to a utility-scale solar PV system. The visual impacts would largely be the same as those described under Alternative 1, as the scale of the solar PV system would remain the same and the visual landscape is similar across Sites A, B, D, and E. Visual sensitivity would also be the same because the sites are only visible from nearby roadways, buildings on NAS Lemoore, and adjacent parcels.

If Sites D and/or E are developed, the portions of the 230-kV transmission line would be underground and thus would not affect the visual environment. Upon clearing the easement, the transmission line would run above ground along the eastern boundary of Sites A and B, then east to tie into the existing PG&E 230-kV transmission line. To support the new 230-kV transmission line, approximately one hundred, 80-foot (24-meter) tall steel poles would be constructed along the proposed route. The proposed route that

spans the eastern side of Sites A and B along 25th Street occurs on an existing electrical transmission line right-of-way with 65-foot tall 69-kV wooden poles. Although the 230-kV transmission line would be slightly taller (approximately 15 feet [6.5 meters]) and thus viewable from further distances, the line would still represent a relatively minimal alteration to the existing visual landscape, as the transmission line would be consistent and comparable to existing nearby electrical infrastructure. The same impacts as described under Alternative 1 from the east-west segment of the 230-kV transmission line would occur under Alternative 2.

Decommissioning

Visual impacts from the decommissioning of the solar PV system would be the same under Alternative 2 as described under Alternative 1.

Summary

The construction and operational visual impacts would largely be the same as those described under Alternative 1, as the scale of the solar PV system would remain the same and the visual landscape is similar across Sites A, B, D, and E. The proposed 230-kV transmission line would be consistent and comparable to the existing viewshed. Therefore, implementation of Alternative 2 would not have a significant impact to visual resources.

3.5.3.3 No Action Alternative

Under the No-Action Alternative, the existing visual environment would not change. Existing visual conditions at Sites A, B, D, and E (as described in Section 3.5.2) would remain. Therefore, the No Action Alternative would not have a significant impact to visual resources.

3.6 CULTURAL RESOURCES

3.6.1 DEFINITION OF RESOURCE

Cultural resources is an inclusive label used to encompass any historic properties or traditional cultural properties and sacred sites valued by traditional communities (often but not necessarily Native American groups). Cultural resources are finite, nonrenewable resources, whose salient characteristics are easily diminished by physical disturbance; certain types of cultural resources also may be negatively affected by visual, auditory, and atmospheric intrusions.

Historic properties are defined in the federal regulations outlining Section 106 of the National Historic Preservation Act (NHPA), as amended (54 USC §§ 300101-305306]), as prehistoric and historic sites, buildings, structures, districts, or objects listed or eligible for listing on the National Register of Historic Places (NRHP), as well as artifacts, records, and remains related to such properties. Compliance with Section 106 of the NHPA, which directs federal agencies to take into account the effect of a federal undertaking on a historic property, is outlined in the Advisory Council on Historic Preservation's regulations, *Protection of Historic Properties* (36 CFR Part 800). A traditional cultural property can be defined generally as one that is eligible for inclusion in the NRHP because of its association with cultural practices or beliefs of a living community that are rooted in that community's history and are important in maintaining the continuing cultural identity of the community.

Cultural resources are generally divided into three categories: archaeological resources, architectural resources, and traditional cultural resources:

- **Archaeological resources** –places where people changed the ground surface or left artifacts or other physical remains (e.g., arrowheads or bottles).

- **Architectural resources –**standing buildings, dams, canals, bridges, and other structures.
- **Traditional cultural resources –** These include traditional cultural properties, which are associated with the cultural practices and beliefs of a living community that link that community to its past and help maintain its cultural identity. Traditional cultural resources may also include archaeological resources, locations of historic events, sacred areas, sources of raw materials for making tools, sacred objects, or traditional hunting and gathering areas.

The NHPA mandates guidelines for the protection of historic properties in Sections 106 and 110 of the law. Section 106 of the NHPA requires federal agencies to analyze the effect of an undertaking on cultural resources included in or eligible to the NRHP. Compliance with Section 106 of the NHPA, is outlined in the Advisory Council of Historic Preservation's regulation, *Protection of Historic Properties* (36 CFR § 800).

The NHPA and associated Section 106 compliance also includes guidance for American Indian consultation regarding cultural significance of potential religious and sacred artifacts (16 USC 470a [a][6][A] and [B]). In addition, coordination with federally recognized American Indian tribes must occur in accordance with EO 13175, *Consultation and Coordination with Indian Tribal Governments*. Section 110 requires federal agencies to establish programs to locate, evaluate, and nominate all properties that qualify for inclusion in the NRHP. As part of this EA, the Navy is consulting with federally recognized American Indian Tribal Groups to identify potential cultural resources in the area of potential effects (APE) (see Appendix A). The Navy would complete consultation with the appropriate federally recognized Tribes before making a decision on the Proposed Action.

Through a combination of cultural resource studies carried out to comply with Sections 106 and 110 of the NHPA, Sites A, B, D, E and the potential solar PV system support areas have been inventoried for cultural resources (Young and Garner 2012; Garner and Waechter 2014; Dougherty and Jones 2015).

3.6.2 AFFECTED ENVIRONMENT

The affected environment for cultural resources is based on the establishment of the APE of an undertaking, through consultation with State Historic Preservation Officer (SHPO). An APE is defined as "the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist" (36 CFR 800.16(d). The APE for this project includes Sites A, B, D, E and the potential solar PV system support areas.

3.6.2.1 Prehistoric and Historic Setting

The following summary of the cultural context for the southern San Joaquin Valley is condensed from the *Integrated Cultural Resources Management Plan for Naval Air Station Lemoore, California* (NAS Lemoore 2012b).

Regional Prehistory

The regional prehistory is divided into the Paleo-Indian, Early, Middle, and Late Periods. The Paleo-Indian period dates prior to 8,000 years Before Present (B.P.). Like many other early sites throughout the western United States, Paleo-Indian sites are characterized by fluted projectile points. Paleo-Indian sites are scarce around NAS Lemoore. However, alluvial deposition may have buried sites in as much as 7 feet (2 meters) of sediment, obscuring them from detection (NAS Lemoore 2012b).

The Early Period ranges from 8,000 to 3,000 B.P. It is a period generally characterized as a time when a greater emphasis was placed on plant resources for subsistence. Settlement patterns appear as seasonal

movements between elevations. The material culture during this period is marked by the appearance of handstones and milling stones (NAS Lemoore 2012b).

During the Middle period (3,000- 1,000 B.P.) subsistence practices diversified with a greater emphasis on seed processing. The decline in the presence of handstones and metates, and the increased presence of mortars and pestles, suggests a greater reliance on acorns rather than wild seeds and grain. Residences appear to be occupied for longer periods of time by greater population sizes (NAS Lemoore 2012b).

The Late Period (1,000 B.P. to Historic Contact) is characterized by further reduction in mobility and intensive resource exploitation. The rise of territorial boundaries and exchange networks are a notable part of this period. The bow and arrow makes its first appearance in the Late Period in the southern San Joaquin Valley (NAS Lemoore 2012b).

History of the NAS Lemoore Area

As early as 1542, the Spanish began to explore parts of California, and were the first Europeans to venture into the region surrounding NAS Lemoore. Spanish exploration for the next 200 years was intermittent in this area, until the 1769 expedition of Gaspar de Portola and Franciscan Father Junipero Serra established missions in Alta, CA. Pedro Fages in 1772 led the first expedition into the southern San Joaquin Valley (NAS Lemoore 2012b).

The early 19th century marked a time of distribution of land grants and encouraged settlement into the interior of California. In 1843, a portion of present-day NAS Lemoore was part of a 48,801-acre land grant owned by Joseph Yves Limatour. At the end of the Mexican-American War in 1848 California became a U.S. territory. Although the California Gold Rush began the same year, the effect of overland migration to California had little initial impact on the area around NAS Lemoore (NAS Lemoore 2012b).

Ranching, farming, and the railroad industry have characterized the land surrounding NAS Lemoore since the mid-19th century. One of the first permanent communities in the area was the town of Lemoore, which received an established post office in 1875. Populations have always been relatively small in the area (NAS Lemoore 2012b).

The Lemoore Army Airfield (located approximately 2 miles (3.2 kilometers) west of the NAS Lemoore Administration Area) was established during World War II. In 1954, the Navy began planning to establish a master jet air station. NAS Lemoore was chosen as the site of the new station because of its central location, good weather for flying, relatively inexpensive land, and nearby accommodations. Construction of NAS Lemoore began in 1958 and NAS Lemoore was commissioned in 1961 (NAS Lemoore 2012b).

3.6.2.2 Cultural Resources within the Affected Environment

Archaeological Resources

Three archaeological sites have been identified within the boundaries of the APE. Site LPV-01 is a historic trash scatter that dates from the early to the mid-20th century, located in the northeastern corner of Site B. This site contains limited information and does not have sufficient data content or potential to yield data to meet the criteria for inclusion in the NRHP. Site LPV-01 has been recommended not eligible for listing in the NRHP (Dougherty and Jones 2015). CA-KIN-0001116H is a historic utility line and CA-KIN-00017H is a portion of the San Joaquin Valley Railroad. These sites run parallel to one another and bisect Sites A and B. They have not been evaluated for listing in the NRHP (Garner and Waechter 2014).

Isolated occurrences are cultural remains or features that do not meet the definition of an archaeological site. Isolated occurrences recorded in the APE include historic porcelain, glass and ceramic fragments,

isolated prehistoric lithics and a historic land marker. Due to the limited number of artifacts found at isolated occurrences and the low potential for providing information on prehistory or history, the isolated occurrences recorded in this APE are not recommended as eligible for inclusion in the NRHP (Dougherty and Jones 2015).

Architectural Resources

The APE does not contain any known architectural resources. The historic railroad and utility line mentioned above are recorded and managed as archaeological sites (NAS Lemoore 2012b).

Traditional Cultural Resources

The APE does not contain any known traditional cultural properties or other traditional cultural resources. As part of this EA, the Navy is consulting with federally recognized American Indian Tribal Groups to identify potential traditional cultural resources in the APE. The Navy will complete consultation with the appropriate federally recognized Tribes before making a decision on the Proposed Action.

3.6.3 Environmental Consequences

3.6.3.1 Alternative 1: Construction, Operation, and Decommissioning of an up to 390 MW Solar PV System at Sites A and B

Sites A and B

Construction

Construction under Alternative 1 would consist of grading and clearing of vegetation. Construction would disturb surface soils to a depth of approximately 6.5 feet (2 meters). Foundations would be built on engineered fill or native soil at a minimum of 2 feet (0.6 meters) below adjacent grade or finished grade.

Three archaeological sites are located within the APE for Alternative 1: LPV-01, CA-KIN-0001116H, and CA-KIN-0001117H. LPV-01, a historic trash scatter, is located in the northeastern corner of Site B. Site LPV-01 would be disturbed by grading and construction of the solar PV panels. However, site LPV-01 is recommended not eligible for listing in the NRHP. Contingent on concurrence from the California SHPO, disturbance of this site would not result in an adverse effect to a historic property.

Sites CA-KIN-0001116H (a historic utility line) and CA-KIN-0001117H (a portion of the San Joaquin Valley Railroad) bisect Sites A and B. CA-KIN-0001116H is comprised of nine utility poles that were once used to power the railroad crossing lights and bells on Reeves Boulevard (Garner and Waechter 2014). Only one of the nine utility poles, the easternmost, lies within the APE. The pole is located within the railroad corridor, along an existing road. This pole would be avoided during construction of the solar PV panels and the perimeter fence. No construction would occur at or adjacent to the San Joaquin Valley Railroad (site CA-KIN-0001117H), which runs through the APE. Because both of these sites would be avoided, there would be no adverse effects.

Alternative 1 construction activities include trenching up to 3 feet (1 meter) for underground electrical lines and circuitry. In addition, the solar PV panel mounting structures require foundations that reach at least 4 to 6.5 feet (1.2 to 2 meters) below ground surface. If buried cultural resources are encountered during excavation, then construction would cease and the NAS Lemoore Natural and Cultural Resources Manager would be contacted before construction could continue.

Under Alternative 1, construction of a 25 MVA substation and a 230-kV switching/metering station would occur within Site A. In addition, a switching station adjacent to the equestrian center in the

northeast portion of the NAS Lemoore housing area would be constructed. A 2-mile (3.2 kilometer) stretch of new 230-kV overhead line would connect the two switching stations. No cultural resources have been documented within the footprint of the MVA substation, the two switching stations, or along the course of the proposed new overhead line. No adverse effect to historic properties would occur.

Operation

Under Alternative 1, post-construction site operations would include use of existing access roads as well as maintenance and repair work. These activities would occur along existing roads and infrastructure, and no ground disturbance would occur. No adverse effect to historic properties or traditional resources would occur.

Decommissioning

The decommissioning of the solar PV panels would require similar activities to construction; work crews, vehicles, and equipment would be required to dismantle and remove the solar PV panels. Because these activities would occur in previously disturbed areas, no historic properties or traditional resources would be adversely affected. As with construction activities, if any unexpected cultural resources are encountered during decommissioning, work would cease and the NAS Lemoore Natural and Cultural Resources Manager would be contacted before work could continue.

Summary

Three archaeological sites are found within the APE of Alternative 1. However, these sites are either recommended ineligible for listing on the NRHP (therefore not a historic property) or would be avoided during construction, operation, and decommissioning activities. Based on the results of the records search and field investigation, the Navy has requested the SHPO concur with a finding of "No Historic Properties Affected" finding (Appendix A). At this time, SHPO concurrence is anticipated. Therefore, implementation of Alternative 1 would not have a significant impact to cultural resources.

Alternative 1 Option: Construction, Operation, and Decommissioning of a 20 MW Solar PV System at Site A

Under the Alternative 1 Option, impacts to cultural resources would be similar to those discussed under the Alternative 1. Therefore, implementation of the Alternative 1 Option would not have a significant impact to cultural resources.

3.6.3.2 Alternative 2: Construction, Operation, and Decommissioning of an up to 390 MW Solar PV System at Sites A, B, D, and/or E

Sites A, B, D, and/or E

Construction

Construction impacts at Sites A and B under Alternative 2 would be similar to those described for Alternative 1. No recorded cultural resources are present at Sites D and E. Under all construction components of Alternative 2, there would be no adverse effects to historic properties or impacts to known traditional resources.

Under Alternative 2, the west-east segment of transmission line would be run underground to avoid encroachment on the existing flight easement. If unexpected cultural resources are encountered during excavation, construction would cease and the NAS Lemoore Natural and Cultural Resources Manager would be contacted before work could continue.

Operation

Operation impacts at Sites A, B, D, and/or E under Alternative 2 would be similar to those described for Alternative 1, but would also occur at Sites D and E. As discussed under Alternative 1, these would occur along existing roads and infrastructure, and no ground disturbance would take place. There would be no adverse effects to historic properties or impacts to known traditional resources.

Decommissioning

Decommissioning impacts at Sites A, B, D and E under Alternative 2 would be similar to those described for Alternative 1, but would also occur at Sites D and E. As discussed under Alternative 1, these would occur in previously disturbed areas. There would be no adverse effects to historic properties or impacts to known traditional resources.

Summary

Three archaeological sites are found within the APE of Alternative 1. However, these sites are either recommended ineligible for listing on the NRHP (therefore not a historic property) or would be avoided during construction, operation, and decommissioning activities. Based on the results of the records search and field investigation, the Navy has requested the SHPO concur with a finding of "No Historic Properties Affected" finding (Appendix A). At this time, SHPO concurrence is anticipated. Therefore, implementation of Alternative 2 would not have a significant impact to cultural resources.

3.6.3.3 No Action Alternative

Under the No Action Alternative, there would be no change to current conditions. Therefore, the No Action Alternative would not have a significant impact to cultural resources.

3.7 AIR QUALITY

3.7.1 DEFINITION OF RESOURCE

3.7.1.1 Criteria Pollutants and Ambient Air Quality Standards

Air quality is defined by ambient air concentrations of specific pollutants that are of concern with respect to the health and welfare of the general public by the USEPA. The USEPA has established National Ambient Air Quality Standards (NAAQS) for these pollutants. The seven major pollutants of concern, called "criteria pollutants," are carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), suspended particulate matter less than or equal to 10 microns in diameter (PM_{10}), fine particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$), and lead. Primary NAAQS are established to protect public health. Secondary NAAQS may also be established to avoid other adverse impacts to the public welfare such as odors or visibility effects. Areas that violate a federal air quality standard are designated as nonattainment areas. Once a nonattainment area meets the standards and redesignation requirements outlined in the Clean Air Act (CAA), the area is designated as a maintenance area.

Ambient air quality refers to the atmospheric concentration of a specific compound (amount of pollutants in a specified volume of air) that occurs at a particular geographic location. The ambient air quality levels measured at a particular location are determined by the interactions of emissions, meteorology, and chemistry. Emission considerations include the types, amounts, and locations of pollutants emitted into the atmosphere. Meteorological considerations include wind and precipitation patterns affecting the distribution, dilution, and removal of pollutant emissions. Chemical reactions can transform pollutant emissions into other chemical substances. Ambient air quality data are generally reported as a mass per

unit volume (e.g., micrograms per cubic meter [µg/m^3]of air) or as a volume fraction (e.g., parts per million [ppm] by volume).

Pollutant emissions typically refer to the amount of pollutants or pollutant precursors introduced into the atmosphere by a source or group of sources. Pollutant emissions contribute to the ambient air concentrations of criteria pollutants, either by directly affecting the pollutant concentrations measured in the ambient air or by interacting in the atmosphere to form criteria pollutants. Primary pollutants, such as CO, SO_2, lead, and some particulates, are emitted directly into the atmosphere from emission sources. PM_{10} and $PM_{2.5}$ are generated as primary pollutants by various mechanical processes (for example, abrasion, erosion, mixing, or atomization) or combustion processes. However, fine particulate matter (PM_{10} and $PM_{2.5}$) can also be formed as secondary pollutants through chemical reactions or by gaseous pollutants condensing into fine aerosols. Secondary pollutants, such as O_3, NO_2, and some particulates, are formed through atmospheric chemical reactions that are influenced by meteorology, ultraviolet light, and other atmospheric processes. In general, emissions that are considered "precursors" to secondary pollutants in the atmosphere (such as volatile organic compounds [VOC] and oxides of nitrogen [NO_x], which are considered precursors for O_3), are the pollutants for which emissions are evaluated to control the level of O_3 in the ambient air.

The State of California has identified four additional pollutants for ambient air quality standards: visibility reducing particles, sulfates, hydrogen sulfide, and vinyl chloride. The California Air Resources Board (CARB) has also established the more stringent California Ambient Air Quality Standards (CAAQS). Areas within California in which ambient air concentrations of a pollutant are higher than the state and/or federal standard are considered to be in nonattainment for that pollutant. Table 3.7-1 details both the federal and state ambient air quality standards.

3.7.1.2 Greenhouse Gases

GHGs are gases that trap heat in the atmosphere. These emissions occur from natural processes and human activities. The most significant of the human activities emitting GHGs is the burning of fossil fuels. The accumulation of GHGs in the atmosphere regulates the earth's temperature. Scientific evidence indicates a trend of increasing global temperature over the past century correlating with an increase in GHG emissions from human activities.

The most common GHGs emitted from natural processes and human activities include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Examples of GHGs created and emitted primarily through human activities include fluorinated gases (hydrofluorocarbons and perfluorocarbons) and sulfur hexafluoride. Each GHG is assigned a global warming potential, which is the ability of a gas or aerosol to trap heat in the atmosphere. The global warming potential scale is standardized to CO_2, which has a value of one. For example, CH_4 has a global warming potential of 21, which means that CH_4 has a global warming effect 21 times greater than CO_2 on an equal-mass basis. CO_2 is the dominant gas in terms of quantities of total GHG emissions, although other GHGs have a higher global warming potential than CO_2. Total GHG emissions from a source are often reported as a CO_2 equivalent (CO_2e). The CO_2e is calculated by multiplying the emissions of each GHG by its global warming potential and adding the results together to produce a single, combined emission rate representing all GHGs.

Table 3.7-1. Ambient Air Quality Standards

Pollutant	Averaging Time	NAAQS[1]		CAAQS
		Primary	Secondary	Concentration
Ozone (O_3)	1-Hour	-	Same as Primary Standard	0.09 ppm (180 µg/m^3)
	8-Hour	0.075 (147 µg/m^3) ppm		0.070 ppm (137 µg/m^3)
Carbon Monoxide (CO)	8-Hour	9.0 ppm (10 mg/m^3)	None	9.0 ppm (10 mg/m^3)
	1-Hour	35 ppm (40 mg/m^3)		20 ppm (23 mg/m^3)
Nitrogen Dioxide (NO_2)	Annual Average	0.053 ppm (100 µg/m^3)	Same as Primary Standard	0.030 ppm (56 µg/m^3)
	1-Hour	-		0.18 ppm (338 µg/m^3)
Sulfur Dioxide (SO_2)	Annual Average	0.03 ppm (80 µg/m^3)	-	-
	24-Hour	0.14 ppm (365 µg/m^3)	-	0.04 ppm (105 µg/m^3)
	3-Hour	-	0.5 ppm (1,300 µg/m^3)	-
	1-Hour	-	-	0.25 ppm (655 µg/m^3)
Suspended Particulate Matter (PM_{10})	24-Hour	150 µg/m^3	Same as Primary Standard	50 µg/m$_3$
	Annual Arithmetic Mean	-		20 µg/m^3
Fine Particulate Matter ($PM_{2.5}$)	24-Hour	35 µg/m$_3$	Same as Primary Standard	-
	Annual Arithmetic Mean	15 µg/m^3		12 µg/m^3
Lead	30-Day Average	-	-	1.5 µg/m^3
	Calendar Quarter	1.5 µg/m^3	Same as Primary Standard	-
3-Month Rolling Average	0.15 µg/m^3			
Hydrogen Sulfide (HS)	1-Hour	No Federal Standards		0.03 ppm (42 µg/m^3)
Sulfates (SO_4)	24-Hour			25 µg/m^3
Visibility Reducing Particles	8-Hour (10 am to 6 pm, Pacific Standard Time)			In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 percent.
Vinyl chloride[2]	24 Hour			0.01 ppm (26 µg/m^3)

Source: CARB 2015a; USEPA 2015a.

Notes: [1] NAAQS (other than O_3, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The O_3 standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when 99 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard.

[2] The CARB has identified lead and vinyl chloride as "toxic air contaminants" with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

mg/m^3= milligrams per cubic meter.

Federal agencies are addressing emissions of GHGs by mandating GHG reductions in federal laws and EOs, most recently in EO 13693 (*Planning for Federal Sustainability in the Next Decade*) (EO 13693 superseded EO 13423 [*Strengthening Federal Environment, Energy, and Transportation Management*] and EO 13514 [E*nergy Efficient Standby Power Devices*]). In 2009, the USEPA signed GHG Endangerment Findings under Section 202(a) of the CAA, stating that six "key" GHGs are a threat to public health and welfare (CO_2, CH_4, N_2O, hydrofluorocarbons, perfluorocarbons, and sulfur

hexafluoride). Since then, the USEPA has been creating standards and regulations for controlling GHG emissions from passenger vehicles. In addition, since 2012 the USEPA has issued proposals and updated regulations to reduce carbon emissions from new and existing power plants, landfills, and oil and natural gas facilities. Despite these efforts, there are no promulgated federal regulations to date limiting GHG emissions. In December of 2014, the CEQ issued revised draft guidance for federal agencies, to guide them on when and how to consider the effects of GHG emissions and climate change in their projects (CEQ 2014).

Several states have passed GHG related laws as a means to reduce statewide levels of GHG emissions. In particular, the California Global Warming Solutions Act of 2006 (Assembly Bill 32) directs the State of California to reduce statewide GHG emissions to 1990 levels by the year 2020. EO S-20-06 further directs state agencies to begin implementing Assembly Bill 32, including the recommendations made by the state's Climate Action Team. Activities taken thus far to implement Assembly Bill 32 include mandatory GHG reporting and a cap-and-trade system for major GHG-emitting sources (CARB 2015b).

In an effort to reduce energy consumption, reduce dependence on petroleum, and increase the use of renewable energy resources in accordance with goals set by EO 13693 and the Energy Policy Act of 2005, the Navy has implemented a number of renewable energy projects. The types of projects currently in operation within military installations include thermal and solar PV energy systems, geothermal power plants, and wind energy generators.

The potential effects of GHG emissions are by nature global and cumulative, and thus it is impractical to attribute climate change to individual projects. Therefore, the impact of GHG emissions associated with this project is discussed in the context of cumulative impacts in Section 4.4.7 of this EA.

3.7.2 AFFECTED ENVIRONMENT

3.7.2.1 Regional Setting

NAS Lemoore is located in the central portion of California's San Joaquin Valley, in Kings and Fresno counties, within the jurisdiction of the San Joaquin Valley Air Pollution Control District (SJVAPCD). The SJVAPCD is currently designated as a nonattainment area for the following NAAQS: 8-hour O_3 (in extreme nonattainment), 24-hour $PM_{2.5}$, and annual $PM_{2.5}$ (USEPA 2015b). On December 14, 2012, the USEPA updated the national annual $PM_{2.5}$ primary standard from 15 $\mu g/m^3$ to 12 $\mu g/m^3$. On March 10, 2015, the USEPA proposed requirements for implementing the $PM_{2.5}$ NAAQS in designated nonattainment areas (USEPA 2015c). Kings and Fresno counties are anticipated to meet the new standard by the year 2020 (USEPA 2012).

The SJVAPCD has achieved attainment for PM_{10}, and is therefore a PM_{10} maintenance area. The entire SJVAPCD is designated as unclassifiable, attainment, or better than national standards for the federal SO_2 and CO standards. There are two small regions within the SJVAPCD that are classified as maintenance areas for CO. These regions are specifically termed the "Fresno Urbanized Area" and the "Stockton Urbanized Area" in the California State Implementation Plan (SIP) for CO (CARB 2004). These maintenance areas are located 40 miles (64 kilometers) and 132 miles (212 kilometers), respectively, from NAS Lemoore. Therefore, NAS Lemoore is not located in a CO maintenance area but is within 40 miles (64 kilometers) of the closest one within the San Joaquin Valley.

The SJVAPCD operates a network of ambient air monitoring stations throughout Kings and Fresno counties. The purpose of the monitoring stations is to measure ambient concentrations of the pollutants and determine whether the ambient air quality meets the CAAQS and the NAAQS. The nearest ambient monitoring stations to the project site are located in Hanford (Kings County) and Huron (Fresno County).

The natural topography and weather constraints of the San Joaquin Valley combined with stationary and mobile sources of pollution make the region one of the most polluted in the state and the country, particularly for O_3.

3.7.2.2 Region of Influence

Specifically identifying the region of influence (ROI) for air quality requires knowledge of the type of pollutant, emission rates of the pollutant source, proximity to other emission sources, and local and regional meteorology. The ROI for NAS Lemoore is defined by the SJVAPCD. For inert pollutants (all pollutants other than O_3 and its precursors), the ROI is generally limited to a few miles downwind from the source. However, for a photochemical pollutant such as O_3, the ROI may extend much farther downwind. O_3 is a secondary pollutant that is formed in the atmosphere by photochemical reactions of previously emitted pollutants, or precursors (VOC and NO_x). The maximum effect on O_3 levels from precursors tends to occur several hours after the time of emission during periods of high solar load and may occur many miles from the source. O_3 and O_3 precursors transported from other regions can also combine with local emissions to produce high local O_3 concentrations.

3.7.2.3 Regulatory Framework

Federal Requirements

Under NEPA, air quality impacts must be evaluated and assessed with regard to the significance of their impacts. In addition to NEPA, the CAA, General Conformity, and New Source Review (NSR) are applicable to analyses of impacts to air quality. These federal requirements are discussed in the following sections.

Clean Air Act

The USEPA is the agency responsible for enforcing the CAA of 1970 and the 1977 and 1990 CAA amendments. The purpose of the CAA is to establish NAAQS, which classify areas as to their attainment status relative to the NAAQS; develop schedules and strategies to meet the NAAQS; and to regulate emissions of criteria pollutants and air toxics to protect public health and welfare. Under the CAA, individual states are allowed to adopt ambient air quality standards and other regulations, provided they are at least as stringent as federal standards. The CAA Amendments established new deadlines for achievement of NAAQS, dependent upon the severity of nonattainment.

The USEPA requires each state to prepare a SIP, which describes how that state will achieve compliance with NAAQS. A SIP is a compilation of goals, strategies, schedules, and enforcement actions that will lead the state into compliance with all federal air quality standards. Each change to a compliance schedule or plan must be incorporated into the SIP. In California, the SIP consists of separate elements for each air basin, depending upon the attainment status of the particular air basin.

The CAA Amendments also require that states develop an operating permit program that would require permits for all major sources of pollutants. The program would be designed to reduce criteria pollutant emissions and control emissions of hazardous air pollutants by establishing control technology guidelines for various classes of emission sources. Under the CAA, state and/or local agencies may be delegated authority to administer the requirements of the CAA, including requirements to obtain permits to operate stationary sources on Navy installations (e.g., Title V operating permits). Section 3.7.2.3 discusses the local permitting requirements for equipment that is subject to these requirements.

General Conformity

Under 40 CFR Part 93 and the provisions of Part 51, Subchapter C, Chapter I, Title 40, Appendix W of the CFR, of the CAA as amended, federal agencies are required to demonstrate that federal actions conform with the applicable SIP. To ensure that federal activities do not hamper local efforts to control air pollution, Section 176(c) of the CAA, 42 USC 7506(c) prohibits federal agencies, departments, or instrumentalities from engaging in, supporting, providing financial assistance for, licensing, permitting or approving any action which does not conform to an approved SIP or federal implementation plan.

The USEPA General Conformity Rule applies to federal actions occurring in nonattainment or maintenance areas when the total direct and indirect emissions of nonattainment pollutants (or their precursors) exceed specified thresholds. The emission thresholds that trigger requirements of the General Conformity Rule are called *de minimis* levels. Table 3.7-2 identifies the federal nonattainment and maintenance pollutants and the relevant *de minimis* emission thresholds for the ROI.

Table 3.7-2. Applicable General Conformity Rule *de minimis* Levels (tons/year)

VOCs	NO_x	CO	SO_2	PM_{10}	$PM_{2.5}$
10	10	NA	100	100	100

Source: USEPA 2015d.

Notes:
1. SJVAPCD is an extreme nonattainment area for the 8-hour federal O_3 standard; VOCs and NO_x are precursors to the formation of O_3.
2. SJVAPCD is considered a maintenance area for the federal PM_{10} standard.
3. SJVAPCD is in nonattainment of the federal $PM_{2.5}$ standard.
4. NA = not applicable because all but the Urbanized Fresno Area and Urbanized Stockton Area have never been classified nonattainment of the federal CO standard.
5. SO_2 is a precursor to the formation of $PM_{2.5}$.

To demonstrate conformity with the CAA, a project must clearly demonstrate that it does not cause or contribute to any new violation of any standard in any area; increase the frequency or severity of any existing violation of any standard in any area; or delay timely attainment of any standard, any required interim emission reductions, or other milestones in any area. A conformity applicability analysis is required for each of the nonattainment pollutants and/or its precursor emissions.

Compliance with the General Conformity Rule can be demonstrated in several ways. Compliance is presumed if the net increase in direct and indirect emissions from a federal action would be less than the relevant *de minimis* level.

New Source Review

A NSR is required when a stationary source has the potential to emit any pollutant regulated under the CAA in amounts equal to or exceeding specified major source thresholds (100 or 250 tons per year), predicated on the attainment status of the air basin and the source's industrial category. A major modification to the source also triggers a NSR. Any new or modified stationary emission source requires construction and operating permits from the SJVAPCD. Through the SJVAPCD's permitting process, all stationary sources are reviewed and are subject to a NSR process. The NSR process ensures that factors such as the availability of emission offsets and their ability to reduce emissions are addressed and conform with the SIP.

Local Requirements

In Kings and Fresno counties, the SJVAPCD is the agency responsible for the administration of federal and state air quality laws, regulations, and policies. The SJVAPCD's tasks include air pollution

monitoring, preparation of the SIP for the San Joaquin Valley Air Basin (SJVAB), and the promulgation of rules and regulations. The SIP includes strategies and tactics to be used to attain the federal O_3 standard within the SJVAB. The SIP elements are taken from the Regional Air Quality Strategy and the SJVAPCD plan for attaining the state O_3 standard, which is more stringent than the federal standard. The SJVAPCD's rules and regulations include procedures and requirements to control the emission of pollutants and to prevent adverse impacts.

These regulations require that facilities constructing, altering, or replacing stationary equipment that may emit air pollutants obtain an Authority to Construct permit. Further, SJVAPCD regulations require stationary sources of air pollutants to obtain and maintain Permits to Operate for all stationary sources subject to the requirements of Regulation II. The Navy must submit applications to the SJVAPCD for their review and approval. The SJVAPCD is responsible for the review of applications and for the approval and issuance of these permits. Once a permit is issued, the Navy is responsible for compliance with the conditions specified in the permit, and is responsible for quantification of emissions associated with the permitted unit.

The potential solar PV system sites are currently used for agricultural operations. Agricultural operations (crops only, not including farm animal operations) currently generate pollutant emissions from operational activities such as tiling the soil, leaving land fallow, driving equipment and vehicles on unpaved roads and surfaces, and burning/grinding/shredding organic matter. The SJVAPCD provides regulations and requires permits for agricultural operations above a certain size and for specific activities with the potential to escalate local air emissions (e.g., agricultural burning, driving on unpaved roads). Rule 8081 limits fugitive dust emissions from off-field agricultural sources. However, on-field agricultural sources and unpaved road segments with less than 75 vehicle trips per day are exempt from Rule 8011, in addition to other exempt agricultural activities.

3.7.2.4 Current Best Management Practices

The Navy currently has a comprehensive air quality management program to comply with all federal, state and local requirements. Mitigation measures that are part of the Navy's air quality management practices are implemented at NAS Lemoore. The Proposed Action would be in compliance with all active air permits in place for NAS Lemoore operations and activities. In addition, equipment used during the construction and operation of the proposed solar PV system would meet all applicable standards.

3.7.3 ENVIRONMENTAL CONSEQUENCES

This resource section focuses on groups of activities that have the potential to result in an impact to the ambient air quality. The analysis was separated by the three project phases as discussed in Chapter 2: construction, operation, and decommissioning. Types of activities that could affect air quality include operation of construction equipment, vehicle trips, and earth moving activities.

3.7.3.1 Approach to Analysis

The air quality analysis estimated the magnitude of emissions that would occur from proposed construction and decommissioning activities. Construction related activities would include clearing vegetation, grading to prepare the site, trenching for utilities, pole mounting and/or concrete footing for the solar PV system installation, and construction/installation of the substations, switching/metering stations, transmission poles, and solar PV panels. Although manufacturing of solar PV cells or panels is not part of this Proposed Action and would occur off-installation, manufacturing of solar PV cells requires potentially toxic heavy metals such as lead, mercury, and cadmium. The manufacturing process can also produce greenhouse gases, such as CO_2, that contribute to global climate change. However,

existing research suggest that the operation of solar PV systems, compared with conventional fossil fuel-burning power plants, significantly reduces air pollution (Intergovernmental Panel on Climate Change 2012).

Operational emissions from maintenance and repair activities would be minor and infrequent, and are therefore evaluated qualitatively herein. Emissions would be generated from operational activities such as the use of vehicles and equipment with combustive engines, and generation of fugitive dust when driving vehicles on unpaved surfaces within and around the solar PV system.

3.7.3.2 Emissions Evaluation Methodology

Air quality impacts from construction activities proposed under each action alternative would primarily occur from combustive emissions due to the use of fossil fuel-powered equipment and fugitive dust emissions (PM_{10} and $PM_{2.5}$) from the operation of equipment on exposed soil. Construction emissions were estimated using the California Emissions Estimator Model, which is the current comprehensive tool for quantifying air quality impacts from land use projects throughout California. The model was developed in collaboration with the air districts of California and includes default data (e.g., emission factors, trip lengths, meteorology, source inventory) that have been provided by the various California air districts to account for local requirements and conditions (California Air Pollution Control Officers Association 2015). For this analysis, default data were overridden in the model by project-specific data (as provided in Chapter 2), when available. Assumptions were made regarding the total number of days each piece of equipment would be used and the number of hours per day each type of equipment would be used. The construction activities were modeled as two phases of construction, each phase being 2 years. Assumptions and model inputs are located within the modeling calculations in Appendix B.

3.7.3.3 Alternative 1: Construction, Operation, and Decommissioning of an up to 390 MW Solar PV System at Sites A and B

Sites A and B

Construction and Decommissioning

Table 3.7-3 presents a summary of the annual emissions associated with construction and decommissioning activities at NAS Lemoore under Alternative 1. Because the potential emissions from construction and decommissioning activities would be in different years, they are not additive. As shown in Table 3.7-3, construction and decommissioning emissions would be below *de minimis* thresholds and would not trigger a formal Conformity Determination under the CAA General Conformity Rule.

Table 3.7-3. Alternative 1 – Construction and Decommissioning Emissions at NAS Lemoore with Evaluation of Conformity

	Emissions (tons/year)					
Emission Source	**VOCs**	**NO_x**	**CO**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Alternative 1 - Construction						
Year - 2016	0.55	1.98	17.11	0.03	2.00	0.74
Year - 2017	0.63	2.69	20.87	0.04	0.67	0.23
Year - 2018	0.55	1.98	17.11	0.03	2.00	0.74
Year - 2019	0.63	2.69	20.87	0.04	0.67	0.23
Alternative 1 - Decommissioning						
Year – 2055	0.37	0.15	0.36	0.0009	0.04	0.009
Conformity *de minimis* Limits	10	10	NA	100	100	100
Exceeds Conformity *de minimis* Limits?	No	No	No	No	No	No

Note: NA = not applicable.

During the proposed construction and decommissioning activities, proper and routine maintenance of all vehicles and other construction equipment would be implemented to ensure that emissions are within the design standards of all construction equipment. Construction equipment with combustive engines would meet the USEPA's Tier 4 emission standards, as practicable to do so. Dust suppression methods (such as using water trucks to wet the construction/decommissioning area) would be implemented to minimize fugitive dust emissions. After construction activities have occurred, a soil stabilizer would be applied to unvegetated soil, and gravel would be placed on access roads between the rows of solar PV panels and around the site perimeter (outside of the fence line).

Operation

Operational air emissions refer to air emissions that may occur after the solar panels have been installed. Air emissions would primarily result from the use of employee vehicles traveling to the project site for maintenance and repair activities, and from travel on unpaved roads and surfaces. Routine maintenance and inspections would occur less than one time per month and would typically require one to two vehicles per event. In addition, there would be a negligible reduction in dust generation because current agriculture activities that generate dust would cease.

On a region-wide scale, the use of solar PV panels would have beneficial air quality impacts because fossil fuels would not be used for the necessary electricity generation, resulting in fewer air emissions (including GHG and criteria pollutant emissions). Providing solar energy to NAS Lemoore or the region would have long-term direct and indirect benefits to air quality in the SJVAB.

General Conformity Applicability Analysis

To address the requirements of the General Conformity Rule, the estimated emissions from proposed construction and decommissioning activities were compared to the *de minimis* levels. As shown in Table 3.7-3, the emissions increases for NO_x, VOCs, SO_2, PM_{10}, and $PM_{2.5}$ would be below the *de minimis* thresholds. A full Conformity Determination would not be required. The Navy has prepared a Record of Non-Applicability (RONA) for CAA conformity (Appendix B).

Hazardous Air Pollutants

The USEPA has listed 188 substances that are regulated under Section 112 of the CAA, and the state of California has identified additional substances that are regulated under state and local air toxics rule. Emission factors for most hazardous air pollutants (HAPs) from combustion sources are roughly three or more orders of magnitude lower than emission factors for criteria pollutants. Trace amounts of HAPs may be emitted from sources during the construction, operation, or decommissioning of the proposed solar PV system; however, the amounts that would be emitted would be small in comparison with the emissions of criteria pollutants. Emissions of HAPs would also be subject to dispersion due to wind mixing and other dissipation factors.

Summary

Alternative 1 would not exceed *de minimis* levels; a Conformity Determination would not be required. HAP emissions would be negligible. Therefore, implementation of Alternative 1 would not have a significant impact to air quality.

Long-term beneficial impacts to air quality would occur with implementation of the solar PV system due to the benefits of contributing to the energy/power grid through alternative energy development and reducing GHG. These potential long-term beneficial impacts would be expected to offset the minor

emissions generated as a result of construction, operational maintenance, and decommissioning of the solar PV system.

Alternative 1 Option: Construction, Operation, and Decommissioning of a 20 MW Solar PV System at Site A

Construction and Decommissioning

The proposed project site and scope would be greatly reduced under the Alternative 1 Option, so the proposed air emissions would be lessened accordingly. Construction would occur over 2 years. Table 3.7-4 presents a summary of the annual emissions associated with construction and decommissioning activities at NAS Lemoore under the Alternative 1 Option. Because the potential emissions from construction and decommissioning activities would be in different years, they are not additive. As shown in Table 3.7-4, construction and decommissioning emissions would be below *de minimis* thresholds and would not trigger a formal Conformity Determination under the CAA General Conformity Rule.

Table 3.7-4. Alternative 1 Option – Construction and Decommissioning Emissions at NAS Lemoore with Evaluation of Conformity

	Emissions (tons/year)					
Emission Source	**VOCs**	**NO_x**	**CO**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Alternative 1 Option - Construction						
Year - 2016	0.27	1.07	9.84	0.02	1.14	0.56
Year - 2017	0.29	1.31	10.64	0.02	0.20	0.08
Alternative 1 Option - Decommissioning						
Year – 2053	0.04	0.14	0.34	0.001	0.01	0.01
Conformity *de minimis* Limits	10	10	NA	100	100	100
Exceeds Conformity *de minimis* Limits?	No	No	No	No	No	No

Note: NA = not applicable.

BMPs proposed under Alternative 1 would also be implemented under the Alternative 1 Option (e.g., routine maintenance of construction equipment, use of water trucks to lessen fugitive dust). Air emissions from construction and decommissioning activities under the Alternative 1 Option would be temporary.

Operation

The operational air emissions from the Alternative 1 Option would be similar as Alternative 1, but would be lessened because of the reduced scope of the project under the Option. Emissions from existing agricultural operations at Site A would cease upon implementation of the Alternative 1 Option.

The project would still have a beneficial impact to the SJVAB as a whole due to the potential reduction in GHG as compared to burning fossil fuels for electricity generation, but the beneficial impact would be smaller compared to as Alternative 1.

General Conformity Applicability Analysis

As shown in Table 3.8-4, the emissions increases for NO_x, VOCs, SO_2, PM_{10}, and $PM_{2.5}$ would be below the *de minimis* thresholds for requiring a full conformity determination. The Navy has prepared a RONA for CAA conformity (Appendix B).

Summary

The Alternative 1 Option would not exceed *de minimis* levels; a Conformity Determination would not be required. Hazardous air pollutant emissions would be negligible. Trace amounts of HAPs may be emitted

from sources during the installation, operation, or decommissioning of the proposed solar PV system; however, the amounts that would be emitted would be small in comparison with the emissions of criteria pollutants.

Therefore, implementation of the Alternative 1 Option would not have a significant impact to air quality.

3.7.3.4 Alternative 2: Construction, Operation, and Decommissioning of an up to 390 MW Solar PV System at Sites A, B, D, and/or E

Sites A, B, D, and/or E

Construction and Decommissioning

Implementation of Alternative 2 would also result in the construction of up to 390 MW solar PV system at Sites A, B, D, and/or E and thus the air quality impacts would be similar. However, Alternative 2 would include the construction and installation of additional transmission lines, both under and above ground, from Sites D and/or E.

Table 3.7-5 presents a summary of the annual emissions associated with construction and decommissioning activities at NAS Lemoore under Alternative 2. Construction would occur in two, 2-year phases. Because the potential emissions from construction and decommissioning activities would be in different years, they are not additive. As shown in Table 3.7-5, construction and decommissioning emissions would be below *de minimis* thresholds and would not trigger a formal Conformity Determination under the CAA General Conformity Rule.

Table 3.7-5. Alternative 2 – Construction and Decommissioning Emissions at NAS Lemoore with Evaluation of Conformity

	Emissions (tons/year)					
Emission Source	**VOCs**	**NO_x**	**CO**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Alternative 2 - Construction						
Year - 2016	0.58	2.22	17.30	0.04	2.55	0.82
Year - 2017	0.72	3.36	20.85	0.04	0.71	0.28
Year - 2018	0.58	2.22	17.30	0.04	2.55	0.82
Year - 2019	0.72	3.36	20.85	0.04	0.71	0.28
Alternative 2 - Decommissioning						
Year – 2055	0.04	0.13	0.33	0.001	0.07	0.01
Conformity *de minimis* Limits	10	10	NA	100	100	100
Exceeds Conformity *de minimis* Limits?	No	No	No	No	No	No

Note: NA = not applicable.

BMPs proposed under Alternative 1 would also be implemented under Alternative 2 (e.g., routine maintenance of construction equipment, use of water trucks to lessen fugitive dust). Air emissions from construction and decommissioning activities under Alternative 2 would be temporary.

Operation

The operational air emissions from Alternative 2 would be as described for Alternative 1.

General Conformity Applicability Analysis

As shown in Table 3.7-5, the emissions increases for NO_x, VOCs, SO_2, PM_{10}, and $PM_{2.5}$ would be below the *de minimis* thresholds for requiring a full conformity determination. The Navy has prepared a RONA for CAA conformity (Appendix B).

Summary

Alternative 2 would not exceed *de minimis* levels; a Conformity Determination would not be required. Hazardous air pollutant emissions would be negligible. Trace amounts of HAPs may be emitted from sources during the installation, operation, or decommissioning of the proposed solar PV system; however, the amounts that would be emitted are small in comparison with the emissions of criteria pollutants. Therefore, implementation of Alternative 2 would not have a significant impact to air quality.

Long-term beneficial impacts to air quality would occur with implementation of the solar PV system due to the benefits of contributing to the energy/power grid through alternative energy development and reducing GHG. These potential long-term beneficial impacts would be expected to offset the minor emissions generated as a result of construction, operational maintenance, and decommissioning of the solar PV system. From an air quality perspective the proposed solar PV system benefits would be expected to off-set and exceed any temporary constraints or risks to air quality within the region.

3.7.3.5 No Action Alternative

Under the No Action Alternative, the existing agricultural operations at Sites A, B, D, and E would continue to occur. Emissions for the No Action Alternative would be from the existing and ongoing agricultural activities. Under the No Action Alternative, the emissions levels would remain constant for those emission sources that are not affected by other federal, state, or local requirements to reduce air emissions. As a result, no net emission increases would result from implementation of the No Action Alternative. With no net emission increases expected, the No Action Alternative is exempt from the General Conformity Rule.

Under the No Action Alternative, the proposed project would not be implemented and there would be no change in activities at Sites A, B, D, and E. Therefore, the No Action Alternative would not have a significant impact to air quality.

3.8 UTILITIES

3.8.1 DEFINITION OF RESOURCE

The Proposed Action would not increase demand or affect natural gas, telecommunications, or wastewater services/infrastructure. As the Proposed Action involves the construction and operation of a solar PV system, this section primarily discusses electricity but also considers water supply and use.

3.8.2 AFFECTED ENVIRONMENT

The Western Area Power Administration provides electricity to NAS Lemoore. NAS Lemoore owns and maintains all transmission lines and related infrastructure within the installation boundaries. Average annual electricity consumption at NAS Lemoore from FY 2008 through FY 2010 was 89,688,410 kilowatt-hours (NAS Lemoore 2014b). The peak NAS Lemoore energy demand (which occurred a few years ago) was just less than 20 MW.

NAS Lemoore's municipal and industrial activities rely primarily on purchased surface water deliveries from the WWD. The WWD receives water from the U.S. Bureau of Reclamation's Central Valley Project (CVP), which stores water from Northern California reservoirs via the Sacramento-San Joaquin Delta and the California Aqueduct and the Delta-Mendota Canal. Ultimately, NAS Lemoore's CVP water is received via the nearby San Luis Canal (NAS Lemoore 2014a).

3.8.2.1 Electricity

A PG&E 69-kV electrical transmission line runs along the eastern boundary of Site A, just west of 25th Street. A 12-kV electrical distribution line runs along the western boundary of Site A, just east of Reeves Boulevard. The Lemoore Substation is located to the south of Site A in the Administrative/Housing Area.

The same 69-kV electrical transmission that runs along the eastern boundary of Site A continues to the north, extending along the eastern boundary of Site B. Several 12-kV electrical distribution lines traverse Site B.

Several 12-kV electrical distribution lines are located within Site D, including lines running parallel to West Stutz Avenue, West Packard Avenue, and South Dickerson Avenue.

A 12-kV electrical distribution line is located along the eastern boundary of Site E. Two separate 12-kV electrical distribution lines bisect Site E along the unpaved access roads.

Potential Solar PV System Support Areas

There are no existing electrical transmission lines within the NAS Lemoore equestrian center. A 12-kV electrical distribution line occurs to the southwest on Lexington Drive. A PG&E 230-kV electrical transmission line is located to the east of the equestrian center, east of Avenal Cutoff Road, off of NAS Lemoore property.

Energy is delivered to NAS Lemoore through a PG&E 69-kV electrical transmission line to the Lemoore Substation, which is located north of Franklin Avenue and west of 25th Street in the Administrative/Housing Area. An existing 69-kV electrical transmission line (from the Henrietta substation located to the south), and an existing 69-kV electrical transmission line (from the PG&E Kearney substation located to the north) serve the substation.

Power is transferred throughout the Station through overhead and underground lines, including 4.6 miles (7.4 kilometers) of 69-kV transmission and 19.8 miles (31.9 kilometers) of 12-kV distribution lines. The existing electrical substations and transmission/distribution systems have adequate capacity to serve NAS Lemoore (NAS Lemoore 2014b).

PG&E owns and operates the existing PG&E Henrietta substation, which is located approximately 0.75 mile (1.2 kilometers) south of the NAS Lemoore Main Gate. The Henrietta substation is served by an existing 230-kV overhead transmission line running north from the PG&E Gates substation located to the south, and an existing 230-kV overhead transmission line running south from the PG&E Gregg substation, which is located to the north.

3.8.2.2 Water Supply and Use

The amount of agricultural water available varies from year to year based on a percentage allocation set annually by the U.S. Bureau of Reclamation against the land's basic water entitlement. In a 100 percent allocation year, each irrigable acre of land is entitled to 847,200 gallons (2.6 acre-feet) of water for irrigation purposes, which totals approximately 9.71 billion gallons (29,810 acre-feet) for all 11,466 acres (4,640 hectares) of irrigable land on NAS Lemoore that lie within the WWD. Since 2003, the percentage allocation set by the Bureau has ranged from a low of 0 percent in 2014 to a high of 100 percent in 2006, with an average allocation of 59.5 percent (NAS Lemoore 2014a).

Passive drainage systems, consisting of drainage sumps and canals, are used throughout most of the agricultural outlease areas to retrieve and reuse excess irrigation water. Ninety percent of parcels have return water pipes to prevent runoff and return water to the fields. Currently, agricultural runoff from any

lease is prohibited and NAS Lemoore encourages lessees to conserve water where they can, including encouraging installation of more efficient irrigations system (such as drip irrigation) where feasible. In addition to encouraging water conservation in a region that is semiarid, this technique helps prevent runoff contributions to soil erosion and the perched aquifer (NAS Lemoore 2014a).

3.8.3 ENVIRONMENTAL CONSEQUENCES

3.8.3.1 Alternative 1: Construction, Operation, and Decommissioning of an up to 390 MW Solar PV System at Sites A and B

Sites A and B

Construction

Under Alternative 1, power used by construction equipment and vehicles would primarily be generated from the consumption of diesel and gasoline from mobile or portable sources (i.e., generators). Temporary and localized power disruption could potentially occur when the solar PV system is brought on-line.

Proposed construction activities would require water, primarily for dust suppression during initial grading and site preparation activities. For development of up to a 390 MW solar PV system, as much as approximately 0.15 acre-feet of water per acre would be used; this equates to approximately 410 acre-feet of water for construction use. The water would be brought to the project area by the private partner; NAS Lemoore would not supply water for construction activities. If available and feasible, reclaimed water (tertiary treated) would be used during construction and water use would be minimized to the extent practicable.

Operation

The operation of Alternative 1 would require a 400 MVA substation, a switching/metering station, and one new 230-kV electrical transmission line to support the electricity generated by the solar PV system. The new 230-kV overhead transmission line would run east-west along the existing southern right-of-way of Lemoore NAS Road to 25th Street. The 230-kV electrical transmission line would connect to the existing PG&E 230-kV electrical transmission line that runs to the east of NAS Lemoore. Existing PG&E utility infrastructure would be sufficient to support the power generated from the proposed solar PV system.

Under Model 2, the power would be delivered via existing PG&E infrastructure to customers located outside of NAS Lemoore. Under the combination of Models 2 and 3, the power would be used both by regional customers and by NAS Lemoore. Under Model 3, a local renewable energy source would be created for NAS Lemoore; the power generated by the solar PV system could meet NAS Lemoore's energy needs. The integration of solar PV power within the region and/or NAS Lemoore would improve power supply, reliability, and availability. Implementation of Alternative 1 would support achievement of the Navy's renewable energy goals and strategies and contribute towards meeting California's renewable portfolio standard.

Periodic cleaning of the solar PV panels would occur. The cleaning would require deionized water. Using a factor of 0.05 acre-feet of water per MW, to periodically clean up to 390 MW of solar PV panels, an annual volume of approximately 20 acre-feet of deionized water would be required. The private partner would use deionized water provided by an off-site source. The water would be trucked in and then applied to the solar PV panels for cleaning. The periodic cleaning process would produce little to no over-spray or

accumulation of water below the solar PV panels. In addition, other cleaning techniques that use little water may be implemented to reduce the amount of water needed for cleaning.

Decommissioning

At the conclusion of the agreement, the partner would be required to decommission the solar PV array and all associated features and return the project area to its pre-project condition. Although the decommissioning of the solar PV system would eliminate the electricity generated from the proposed PV system, conditions would return to those described in Section 3.8.2. Temporary and localized power disruptions may occur when the system is decommissioned. Power used for construction equipment and vehicles would primarily be generated from the consumption of diesel and gasoline from mobile and portable sources.

Up to approximately 35 acre-feet of water would be used during decommissioning activities, primarily for dust suppression. The water would be brought to the project area by the private partner; NAS Lemoore would not supply water for decommissioning activities. If available and feasible, reclaimed water (tertiary treated) would be used during decommissioning activities.

Summary

Under Alternative 1, there would be the potential for temporary and localized power disruption when the solar PV system comes on-line. Alternative 1 would support achievement of Navy's renewable energy goals and strategies. Under the Model 2 and combination of Models 2 and 3, there would be an increase in regional power supply. Under Model 3, a local renewable energy source would be created for NAS Lemoore. Existing and/or new electrical infrastructure would be sufficient to support the solar PV system. The private partner would use off-site sources to meet all project water needs; NAS Lemoore would not supply water. There would be no impact to NAS Lemoore water supply or use. Therefore, implementation of Alternative 1 would not have a significant impact to utilities.

Alternative 1 Option: Construction, Operation, and Decommissioning of a 20 MW Solar PV System at Site A

Under the Alternative 1 Option, impacts to utilities would be similar to those discussed under Alternative 1, though at a smaller scale. If developed under Model 3, the 20 MW rate of solar PV power generation would be sufficient to meet NAS Lemoore's current electricity demand. Construction would require up to approximately 21 acre-feet of water, periodic cleaning of the solar PV panels would require approximately 1 acre-foot of deionized water per year, and decommissioning activities would require approximately 2 acre-feet of water. All water would come from suppliers other than NAS Lemoore. Therefore, implementation of the Alternative 1 Option would not have a significant impact to utilities.

3.8.3.2 Alternative 2: Construction, Operation, and Decommissioning of an up to 390 MW Solar PV System at Sites A, B, D, and/or E

Under Alternative 2, impacts to utilities would the same as described for Alternative 1. Therefore, implementation of Alternative 2 would not have a significant impact to utilities.

3.8.3.3 No Action Alternative

Under the No Action Alternative, the Navy would not enter into an agreement with a private partner to construct and operate a solar PV system at NAS Lemoore. The No Action Alternative would not support the Navy's renewable energy goals and strategies. The existing electrical substations and transmission/ distribution systems would continue to have adequate capacity to serve NAS Lemoore's demand. There

would be no impact to NAS Lemoore water supply or use. Therefore, the No Action Alternative would not have a significant impact to utilities.

3.9 TRANSPORTATION

3.9.1 DEFINITION OF RESOURCE

For the purposes of this analysis, transportation refers to the movement of vehicles on both public and private roadways. Figure 3.9-1 illustrates the local and regional roadway network, access restricted areas and access gates surrounding and within NAS Lemoore.

3.9.2 AFFECTED ENVIRONMENT

The affected environment for transportation includes the internal road network of NAS Lemoore and surrounding public streets in both Kings and Fresno counties. NAS Lemoore is located 40 miles (64 kilometers) south of the City of Fresno, and about 7 miles (11 meters) west of the City of Lemoore. Regional access to the project area is provided primarily via California State Route (SR) 198, which runs along a generally east/west alignment from Interstate 5 through the City of Lemoore. SR-198 extends along the southern boundary of NAS Lemoore and connects to local roads leading to the following four access gates: Main Gate, Operations Side Main Gate, Reeves Gate, and Avenal Gate (Figure 3.9-1). Secondary access to and from the project vicinity is provided by SR-41 and SR-269. SR-41 extends along a north/south axis from Fresno through SR-198. SR-269 also runs in a north/south direction, and connects SR-145 to SR-198 and points south to the west of NAS Lemoore. Based on data collected by Caltrans (2013c) for roadway segments near NAS Lemoore, SR-198 has an existing average daily traffic volume of 12,600, while SR-41 and SR-269 have average daily traffic volumes of 17,300 and 3,600, respectively. Within Kings County, both SR-198 and SR-41 operate at Level of Service (LOS)[7] C or better near NAS Lemoore (Kings County 2006). Given the relatively low traffic volume, SR-269 is expected to operate at LOS B.

NAS Lemoore has three developed areas known as the Administrative Side, the Operations Side and the Family Housing Area. The Administrative Side and the Family Housing Area are located adjacent to each other in the southeastern portion NAS Lemoore. A same perimeter fence encloses both areas. Activities that occur on the Administrative Side include personnel and family support functions, and mission support activities that do not occur near the runways, hangars and other facilities within the Operations Side (NAS Lemoore 2014b).

Access to the Administrative Side occurs primarily through the Main Gate via SR-198 and Franklin Avenue, and there is a second gate approximately 1 mile (1.6 kilometers) north on Reeves Boulevard called the Reeves Gate (NAS Lemoore 2014b). The Reeves Gate includes two separate access points. The first one is on Reeves Boulevard, which accommodates vehicles that are travelling southbound.

[7] Roadway operating conditions are described in terms of LOS ratings, which have been developed by the Transportation Research Board. LOS is rated on a scale of A to F, with LOS A reflecting free-flowing traffic conditions and LOS F representing heavily congested conditions (Transportation Research Board 2010). Generally, LOS C or better is considered an acceptable operating condition during peak traffic periods in more rural contexts, while LOS D is considered to adequate in more urbanized areas.

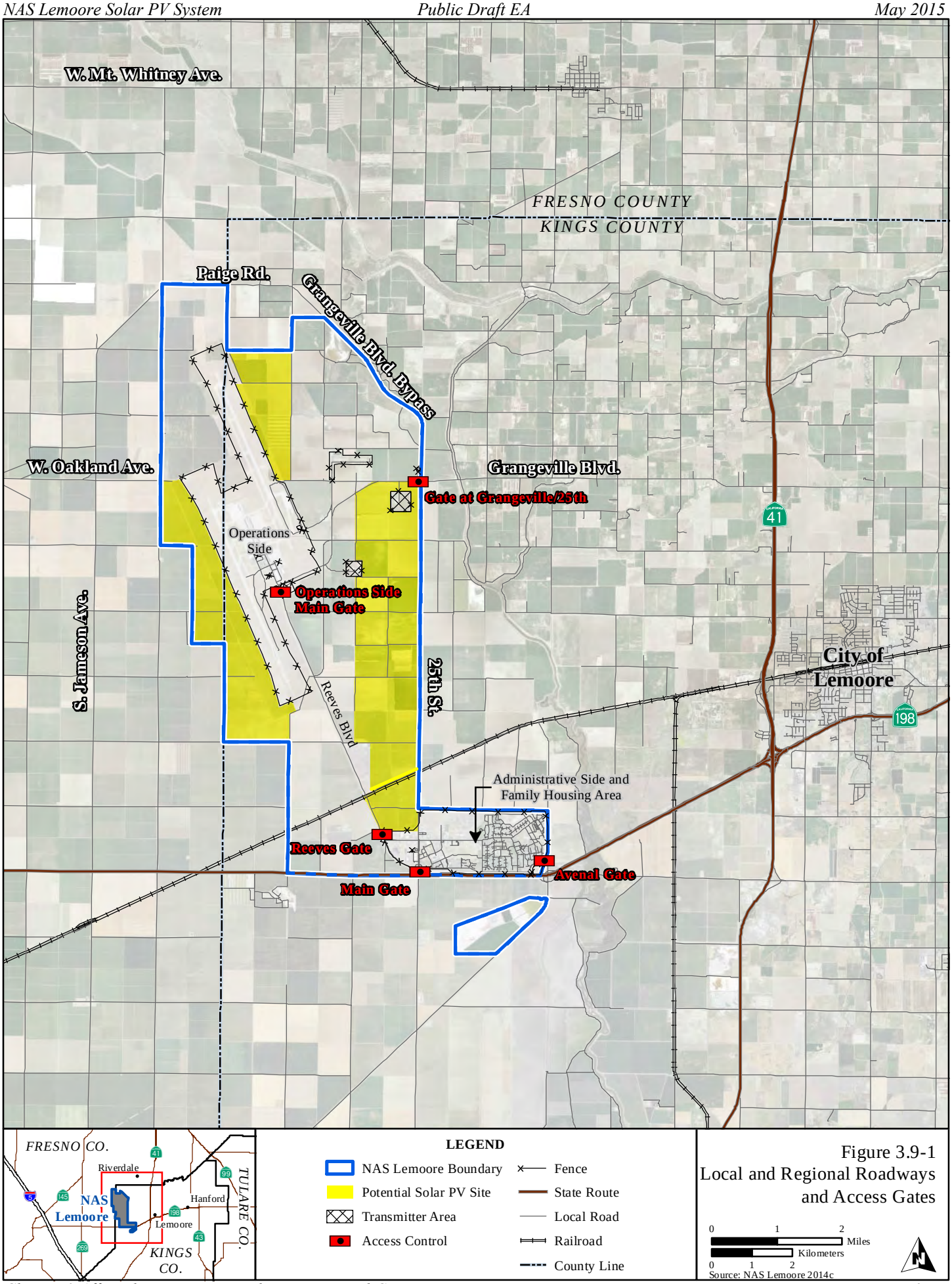

Figure 3.9-1
Local and Regional Roadways and Access Gates

The second entrance is located on a roadway that runs along the western Administrative Side fence line, and intersects with Reeves Boulevard just north of the Administrative Side fence line. Access to the Family Housing Area occurs primarily through the Avenal Gate (along Jackson Avenue/Franklin Avenue).

The Operations Side is enclosed by a separate fence, and is located approximately 5 miles (8 kilometers) northwest of the Administrative Side. The Operations Side includes two runways, aircraft hangars, maintenance shops, supply and other mission-support activities not conducted on the Administrative Side. The Operations Side Main Gate is also located on Reeves Boulevard, approximately 4 miles (6 kilometers) north of the Reeves Gate, and is the primary access point to the Operations Side (NAS Lemoore 2014b).

A fifth gate is located along Grangeville Boulevard at 25th Street. This gate is arranged to process traffic approaching NAS Lemoore from the east, via Grangeville Boulevard. However, motorists may access Site B and Site E without proceeding through this gate.

Outside of the Administrative Side, the Operations Side, and the Family Housing Area, the rest of the land on NAS Lemoore (approximately 13,234 acres [5,356 hectares]) is primarily undeveloped and is not enclosed by a perimeter security fence. Each of the potential solar PV sites are accessible via existing unpaved roads that lie outside of the separate, fenced Administrative Side and Operations Side on NAS Lemoore. In general, these unpaved roadways run along the perimeter of the large agricultural plots located outside of the Operations Side, the Administrative Side, and the Family Housing Area.

3.9.3 ENVIRONMENTAL CONSEQUENCES

3.9.3.1 Alternative 1: Construction, Operation, and Decommissioning of an up to 390 MW Solar PV System at Sites A and B

Sites A and B

Construction

Construction materials and equipment would be placed at one or more staging areas before the start of construction. Construction equipment would be delivered by trucks that would arrive to the vicinity of NAS Lemoore along SR-198. Transfer of materials and equipment would then occur on existing roadways, including Reeves Boulevard, Gateway Road, and Grangeville Boulevard, as well as unpaved, unnamed roadways in the agricultural areas. Construction workers would arrive to the site along a similar route, and a minimal amount of excavated material would be removed from the site along these roadways. Construction trips would result in a temporary increase in truck and passenger vehicle traffic on these roadways. Panel assembly would occur at the staging area(s) and other construction equipment and materials would be stored on site at the staging area(s) for the duration of construction. As a result, the delivery of construction equipment and materials would not result in a recurring increase in traffic volumes during construction.

In addition to the delivery of construction materials and equipment and the removal of construction debris, a peak of approximately 370 construction workers would travel to and from Sites A and B over the duration of the construction period. As a result, there would be a temporary increase in traffic associated with vehicle trips. Construction worker trips are likely to coincide with the traditional peak commuting periods (typically between 7:00 and 9:00 a.m. and 4:30 to 6:30 p.m.). Assuming each of the workers would drive alone to and from the construction zone, workers would generate a maximum of 740 daily trips during the construction period. This is a conservative assumption, given that some workers may elect

to carpool if feasible. Vehicle trips would be distributed to SR-198, SR-41, SR-269, and other local and regional facilities. However, even if all trips were added to a single state route (which is not likely), the proportional increase in traffic would be comparatively minor on SR-198 (i.e., 5.8 percent) and SR-41 (4.2 percent), and moderate on SR-269 (28 percent). The temporary increase in traffic would not alter existing LOS.

Vehicles would proceed to construction areas in Sites A and B, which are located outside the perimeter security fences that enclose the Operations Side and the Administrative Side/Family Housing Area. As a result, project trips would not interact with vehicles entering NAS Lemoore at the Main Gate, Operations Side Main Gate or Reeves Gate.

Operation

Under Alternative 1, operation would involve maintenance activities that would occur periodically and would require a small number of vehicle trips per year to Sites A and B. All maintenance trips would occur outside of the fenced areas of NAS Lemoore, and would not contribute toward delays and queues at the NAS Lemoore access gates.

Decommissioning

Decommissioning activities would include the decommissioning of the solar PV system and removal of the materials from the site. Equipment would be conveyed to the site by truck, and would be parked in a staging area within the project site during the duration of the decommissioning. There would be a temporary increase in traffic associated with the delivery of decommissioning equipment, the removal of debris from the site, and from worker trips. The temporary increase in traffic would have not alter existing LOS.

Vehicles would proceed to construction areas in Sites A and B, which are located outside the perimeter security fences that enclose the Operations Side and the Administrative Side/Family Housing Area. As a result, decommissioning trips would not interact with vehicles entering NAS Lemoore at the Main Gate, Operations Side Main Gate or Reeves Gate.

Summary

Alternative 1 would involve temporary increases in traffic associated with construction, operations and maintenance, and decommissioning activities. Some of the trips associated with these activities (i.e., delivery of construction materials and equipment; the removal of construction debris; and operations and maintenance) would be periodic, and would not regularly add traffic to the roadway network. The traffic generation associated with these activities is expected to be comparatively light. Construction and decommissioning vehicle trips would recur throughout the associated project phase. As discussed above, the volume of vehicle trips is relatively minor, and is not expected to affect existing LOS. Moreover, because the construction areas are outside of fenced areas on NAS Lemoore, traffic from Alternative 1 would not contribute toward any delays or queues at NAS Lemoore access gates. Therefore, implementation of Alternative 1 would not have a significant impact to transportation.

Alternative 1 Option: Construction, Operation, and Decommissioning of a 20 MW Solar PV System at Site A

Under Alternative 1 Option, impacts to transportation would be similar to those discussed under Alternative 1, but activities would be concentrated to Site A. As would be the case with Alternative 1, construction traffic would be able to access Site A via paved and unpaved roadways located outside the NAS Lemoore fence line. As a result, construction trips would not contribute toward queues or delays at

NAS Lemoore access gates. Therefore, implementation of the Alternative 1 Option would not have a significant impact to transportation.

3.9.3.2 Alternative 2: Construction, Operation, and Decommissioning of an up to 390 MW Solar PV System at Sites A, B, D, and/or E

Under Alternative 2, impacts to transportation would be similar to those of Alternative 1. The main difference is that construction, operations and maintenance, and decommissioning trips may also access Sites D and/or E, in addition to Sites A and B. Because Alternative 2 would have the same traffic generation as Alternative 1, the distribution of trips to additional locations would alter turning movements at some intersections and would reduce the concentration of traffic on some roadways. As with Alternative 1, Alternative 2 would not contribute toward any incremental increase in delays or queues at access gates at the Operations Side, the Administrative Side, or the Family Housing Area. Therefore, implementation of Alternative 2 would not have a significant impact to transportation.

3.9.3.3 No Action Alternative

Under the No Action Alternative, NAS Lemoore would not develop a solar PV system. There would be no net increase in traffic associated with construction, operations and maintenance, or decommissioning activities. Therefore, the No Action Alternative would not have a significant impact to transportation.

CHAPTER 4
CUMULATIVE IMPACT ANALYSIS

4.1 INTRODUCTION

CEQ regulations implementing NEPA require that the cumulative impacts of a Proposed Action be assessed (40 CFR Parts 1500-1508). A cumulative impact is defined as the following:

> *"the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." (40 CFR § 1508.7)*

Cumulative effects are most likely to arise when a relationship exists between the Proposed Action and other actions expected to occur in a similar location or during a similar time period. Actions overlapping with or in proximity to the Proposed Action would be expected to have more potential for a relationship than those more geographically separated.

CEQ's guidance for considering cumulative effects states that NEPA documents "should compare the cumulative effects of multiple actions with appropriate national, regional, state, or community goals to determine whether the total effect is significant" (CEQ 1997). The first step in assessing cumulative effects; therefore, involves identifying and defining the scope of other actions and their interrelationship with the Proposed Action or alternatives. The scope of the cumulative effects analysis involves both the geographic extent of the effects and the timeframe in which the effects could be expected to occur. The scope must consider other projects that coincide with the location and timing of the Proposed Action and other actions, and the duration of potential effects on the environment. Section 4.2 identifies the projects considered in the cumulative analysis. Section 4.3 provides an analysis of potential cumulative impacts for each of the environmental resources discussed in this EA.

4.2 PAST, PRESENT, AND REASONABLY FORESEEABLE ACTIONS

This section identifies past, present, and reasonably foreseeable future actions not related to the Proposed Action that have the potential to cumulatively impact the resources in the affected environment for NAS Lemoore and the associated regionally affected area. The geographic distribution, intensity, duration, and historical effects of similar activities were considered when determining whether a particular activity may contribute cumulatively to the impacts of the Proposed Action on the resources identified in this EA. The following discussion lists the past, present, and reasonably foreseeable future projects assessed in this section, along with any NEPA or environmental analysis that has been prepared or is anticipated to occur. Figure 4-1 depicts the locations of these projects.

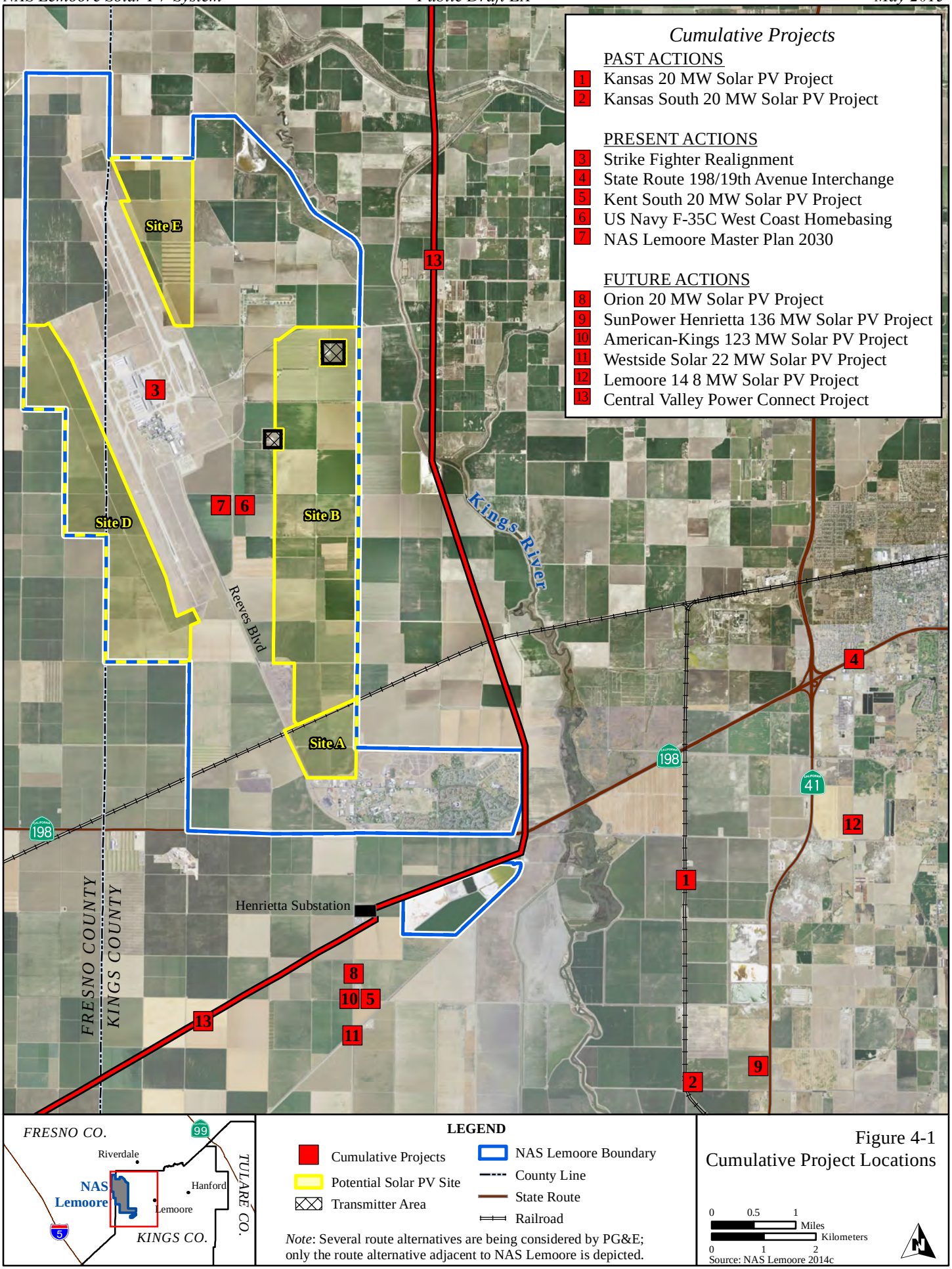

Figure 4-1
Cumulative Project Locations

4.2.1 PAST ACTIONS

Three past actions relevant to the analysis of cumulative impacts at NAS Lemoore have been identified and are described below.

- **Kansas 20 MW Solar PV Project**. This constructed 20 MW solar project is located southeast of NAS Lemoore (15515 21st Avenue, Lemoore). The Kansas Solar PV Project resulted in impacts to land use from the loss of farmland of statewide importance, biological resources, and transportation/traffic during construction (Kings County 2012).
- **Kansas South 20 MW Solar PV Project**. This 20 MW solar project is located southeast of NAS Lemoore (East side of 21st Avenue and north of Kansas Avenue, Stratford, CA). The project began operating in 2013. NRG Energy Inc. operates Kansas South via a Power Purchase Agreement with PG&E (NRG Energy Inc. 2014)**.** The Kansas South Solar PV Project resulted in impacts to land use from the loss of farmland of statewide importance, cultural resources, transportation/traffic during construction, air quality, biological resources, geology, hazardous materials, and water resources (Kings County 2013).

4.2.2 PRESENT ACTIONS

The following present actions are relevant to the analysis of cumulative impacts at NAS Lemoore.

- **Environmental Assessment (EA) for Strike Fighter Realignment at NAS Lemoore, California** (Navy 2011). This project involved the relocation of 24 FA-18E/F Super Hornet aircraft from the East Coast to NAS Lemoore and the transition of up to five squadrons of older FA-18C Hornet aircraft based at NAS Lemoore to newer FA-18E/F Super Hornets. The Strike Fighter realignment is scheduled to occur at NAS Lemoore between 2012 and 2015. Impacts associated with this action are primarily related to an increase in personnel, and associated impacts to socioeconomics, schools, and public services. Additional, less than significant, impacts are associated with the modification of structures constructed in 1959, but not eligible for the NRHP.
- **State Route 198/19th Avenue Interchange.** SR-198 is a major travel corridor and the main commuter route providing access to NAS Lemoore. A construction project is proposed to create an interchange where SR-198 and 19th Avenue meet in the City of Lemoore, approximately 4.5 miles (7.2 kilometers) east of NAS Lemoore. Construction began in spring 2013 and is expected to be completed in spring 2015 (Caltrans 2014). Impacts are to transportation/traffic (adverse during construction and beneficial during operation) and safety (beneficial) and would be localized to the project area.
- **Kent South 20 MW Solar PV Project.** This 20 MW solar project is located immediately south of NAS Lemoore (17264 25th Avenue, Lemoore, CA). A conditional use permit (12-02) has been approved for Recurrent to develop the project. As of December 2014, construction was on-going. The project would result in less than significant impacts to air quality, biological resources, geology, hazardous materials, and water resources.
- **US Navy F-35C West Coast Homebasing** (Navy 2014b). The Navy has prepared an EIS for the west coast homebasing of the F-35C at NAS Lemoore. As described in the EIS, seven Pacific Fleet FA-18 squadrons (70 total aircraft) currently based at NAS Lemoore would progressively transition to the new F-35C aircraft beginning in 2015 with the transition to be complete by 2028. Facility development needed to support F-35C homebasing may begin as early as 2015. The EIS

predicts beneficial impacts to socioeconomics related to increased employment opportunities at NAS Lemoore, but potentially adverse impacts to housing, schools, and public services (e.g., police support). The EIS projects less than significant impacts to safety related to an increased BASH risk. This risk is mitigated with a revised BASH plan developing policies to minimize the likelihood of incidents.

- **NAS Lemoore Master Plan 2030** (NAS Lemoore 2014b). The NAS Lemoore 2030 Master Plan identifies numerous funded, programmed, or unprogrammed projects throughout the Operations, Administration, and Ordnance and Fire School areas. These projects are currently being implemented.

4.2.3 FUTURE ACTIONS

- **Solar PV System Projects.** The following reasonably foreseeable solar projects are located in the cumulative effects region. The impacts associated with these facilities would be similar to those of past and present proposed PV projects, including less than significant impacts to air quality, biological resources, geology, hazardous materials, and water resources:
    - **Orion 20 MW Solar PV Project.** Located south of NAS Lemoore (16480 25th Avenue, Lemoore, CA), this project has received a conditional use permit (12-01) but as of January 2015, construction has not started.
    - **SunPower Henrietta 136 MW Solar PV Project.** Located southeast of NAS Lemoore (17515 20th Avenue, Lemoore, CA), this project has received a conditional use permit (11-03) but as of January 2015, construction has not started.
    - **American-Kings (First Solar) 123 MW Solar PV Project.** Located south of NAS Lemoore adjacent to the PG&E Henrietta substation (15866 25th Avenue, Lemoore, CA), this project received a conditional use approval (11-01) and is scheduled to start construction in October 2015.
    - **Westside Solar 22 MW Solar Project.** Located south of NAS Lemoore (southwest corner of 25th Ave and Avenal Cutoff), this project is estimated to start construction in 2015. A Initial Study and Mitigated Negative Declaration was prepared for this project (Kings County Community Development Agency 2015).
    - **Lemoore 14 8 MW Solar Project.** Located east of NAS Lemoore (14805 19th Avenue), this project received a conditional use approval in November 2014. Construction is estimated to start in 2015 or 2016 (Kings County 2014).
- **Central Valley Power Connect Project.** PG&E's Central Valley Power Connect is a proposed new 230-kV electric transmission line connecting Gates Substation east of Coalinga and Gregg Substation northwest of Fresno. The transmission line would span about 70 miles (113 kilometers) within a study area that includes portions of Fresno, Kings and Madera counties. In addition to other needs, the project is needed to help grid operators integrate clean power in and out of the Central Valley. PG&E is currently studying several route alternatives; one of the routes would be located adjacent to the southeast boundary of NAS Lemoore and parallel with an existing 230-kV transmission line (PG&E 2014).

4.3 METHODOLOGY

4.3.1 GEOGRAPHIC SCOPE OF THE CUMULATIVE EFFECTS

For this analysis, a geographic scope, or ROI, for each cumulative effects issue was established. The ROI is generally based on the natural boundaries of the resources affected, rather than jurisdictional boundaries. The geographic scope may be different for each cumulative effects issue. The geographic extent of analysis may be different for each cumulative effects issue. The geographic analysis range for cumulative effects often extends beyond that of the direct effects of the proposed action. However, cumulative impact analysis does not extended beyond the area subject to indirect effects of the proposed action and alternative. Geographic area may vary among resources, as indirect effects associated with a Proposed Action also vary in extent by resource. However, if the Proposed Action and Alternatives are determined to have no direct or indirect effects on a resource, no future cumulative effects analysis is necessary. ROIs are defined in Section 4.4 for each resource listed below. Because ROIs vary for different resources, not all of the projects listed in Section 4.2 would be located within the ROIs defined for a particular resource.

4.3.2 TIME FRAME OF THE CUMULATIVE EFFECTS ANALYSIS

A time frame for each issue related to cumulative effects has been determined. The time frame is defined as the long-term and short-term duration of the effects anticipated. Long-term can be as the longest lasting effect. Time frames, like geographic scope, can vary by resource. Each project in a region has its own implementation schedule, which may or may not coincide or overlap with the schedule for implementing the Proposed Action. This is a consideration for short-term impacts from the Proposed Action. However, to be conservative, the cumulative analysis assumes that all projects in the cumulative scenario are built and operating during the operating lifetime of the Proposed Action.

Past actions are projects that have been approved and/or permitted, and that have either very recently completed construction/implementation or have yet to complete construction/be implemented. Present actions are actions that are ongoing at the time of the analysis. Reasonably foreseeable future actions are those for which there are existing decisions, funding, or formal proposals, or which are highly probable based on known opportunities or trends. However, these are limited to within the designated geographic scope and time frame. Reasonably foreseeable future actions are not limited to those that are approved for funding. However, this analysis does not speculate about future actions that are merely possible, but rather highly probable based on information available at the time of this analysis.

For this cumulative effects analysis, the time frame considered for cumulatively considerable projects includes projects recently approved or completed that are not yet addressed as part of the existing conditions of the area, projects under construction, and projects that are in the environmental review or planning process and for which enough information is available to discern their potential impacts. Projects for which no or insufficient information is known, or for which substantial uncertainty exists regarding the project, are considered speculative and are not evaluated as part of this analysis.

4.4 CUMULATIVE IMPACT ANALYSIS

This section addresses the potential cumulative impacts of the Proposed Action in conjunction with the aforementioned cumulative projects. These projects represent past, present, and reasonably foreseeable actions with the potential for cumulative impacts when considered in conjunction with the potential impacts from the Proposed Action. However, if a proposed action would not result in direct or indirect impacts on a resource area, the action would not contribute to a cumulative impact on that resource area and no further evaluation from a cumulative impact perspective is warranted. The resources that do not

meet these criteria are public health and safety (Section 3.3), cultural resources (Section 3.6), and transportation (Section 3.9). Therefore, the Proposed Action would not cumulatively contribute to impacts to these resources areas, and they are not evaluated further in this section.

4.4.1 LAND USE

Land use within the project area is currently developed/productive agricultural land. Development potential of the land for other uses is limited by the safety requirements associated with the NAS Lemoore operations, as well as the NAS Lemoore Master Plan. Implementation of the action alternatives at Sites A and B would be consistent with the NAS Lemoore Master Plan, as the proposed site(s) have been noted for their solar development potential. The identified military cumulative projects are also consistent with land use designations for a military installation and the NAS Lemoore Master Plan. The action alternatives would also be consistent with regional solar PV projects by others. The farmland of statewide importance would be available for future agricultural use at NAS Lemoore's discretion.

The Kansas South 20 MW Solar project prepared a Soil Reclamation Plan to restore farmland of statewide importance to its pre-project condition after the life cycle of the project. This approach is likewise being followed by the other solar PV projects throughout the region, as the majority of these projects result in converting agricultural land to solar PV projects. These land use changes are all subject to zoning and development review within the county to ensure consistency with all zoning, long range planning, and community intentions for land use in the region. Therefore, Alternatives 1 or 2 would not have the potential to contribute appreciably to significant cumulative impacts to land use in conjunction with the impacts from other potentially cumulative actions.

4.4.2 BIOLOGICAL RESOURCES

Biological resources within the project area are lacking in diversity and quality habitat. All of the potential solar PV sites are currently leased by the Navy for agriculture use and are regularly disturbed, mechanically and chemically (herbicides/pesticides), for crop production. There is very little natural vegetation in the agricultural areas, as the fields are plowed or disked to the edge of roads and irrigation ditches. Non-native, herbaceous plant species are sparsely distributed along the borders of unpaved access roads and irrigation ditches near the agricultural fields.

The majority of non-developed land at NAS Lemoore is currently active or fallow agricultural land that does not provide suitable habitat for the majority of wildlife species that occur in the San Joaquin Valley. Two habitat management areas are adjacent to, but not within, the project area. NRMA 4 is approximately 50 acres (20 hectares) of annual grassland habitat, and is located in the northern part of NAS Lemoore. NRMA 5 is approximately 116 acres (47 hectares) of annual grassland and brushland habitat, and is managed for the federally listed San Joaquin kangaroo rat in the northeastern part of NAS Lemoore. The project area and surroundings also provide nesting, roosting, and foraging habitat for approximately 170 species of birds, 54 of which are likely resident species.

The Proposed Action entails construction, operation, and decommissioning of a solar PV system on lands that are currently used for agricultural purposes and that are highly disturbed. The Proposed Action would not be likely to adversely affect any federally listed threatened or endangered species or any other species of concern. Recent data and studies suggest that solar PV projects may deter use by the majority of bird species; the Proposed Action would also include features to minimize use of the facility by perching and nesting bird species. Thus, it is unlikely that the biological resource conditions would be substantially reduced or improved over the existing highly disturbed conditions with the implementation of the Alternatives 1 or 2.

Past, present, and future projects, including other solar PV system projects, have been, and would similarly be required to avoid or minimize direct and indirect effects to biological resources. Impacts to biological resources would be similar for these projects as with the Proposed Action, as these projects also seek to convert highly disturbed agricultural land with poor habitat into solar PV projects. The region surrounding the project area is largely composed of agricultural land that is highly manipulated and disturbed, thereby providing little value to biological resources. Therefore, Alternatives 1 or 2 would not have the potential to contribute appreciably to significant cumulative impacts to biological resources in conjunction with the impacts from other potentially cumulative actions.

4.4.3 PUBLIC HEALTH AND SAFETY

Military training within the ROI often involves activities that are inherently hazardous to non-participating personnel, vehicles, or aircraft. The Proposed Action in conjunction with the past, present, and reasonably foreseeable projects would convert large areas of active agricultural land on and in the vicinity of NAS Lemoore into solar PV projects. These facilities cumulatively have the potential to contribute to changes in wildlife patterns and in reflective glare, both of which pose safety risks to pilots. However, recent studies suggest that solar PV facilities do not attract birds and may reduce BASH risk, and thus potential wildlife/safety impacts would be reduced.

Adverse impacts to public health and safety are not anticipated from the combined effects of the implementation of Alternatives 1 or 2 with other planned area projects, based on the analysis contained in this EA. Solar PV panels installed adjacent to or near the NAS Lemoore runways would be low-profile and essentially non-reflective (2 percent reflective), presenting no hazard to approaching or departing aircraft. The regional solar PV projects are subject to public review through the King's County conditional use permit process, as well as other statutory public review processes, which include a safety review and opportunity for input by NAS Lemoore.

The incidence of Valley Fever is increasing in the San Joaquin Valley. The most significant determinant of exposure is soil disturbance, as is typical of both agricultural and construction practices. In windy and dry conditions, the exposure risk may increase as dust becomes more widespread in the San Joaquin Valley. The Proposed Action, as well as all past, present, and reasonably foreseeable future projects in the region, would include dust abatement measures, which would contribute to reducing potential Valley Fever exposure. The conversion of regularly-disturbed agricultural land to solar PV projects throughout the region may cumulatively contribute to a reduction of dust in the region. While drought may increase dust and associated Valley Fever exposure risk, increased solar PV development in the San Joaquin valley would reduce dust and associated fever risk. Therefore, Alternatives 1 or 2 would not have the potential to contribute appreciably to significant cumulative impacts to public health and safety in conjunction with the impacts from other potentially cumulative actions.

4.4.4 SOCIOECONOMICS

Agriculture accounts for 15.9 percent of Kings County employment and 13.5 percent of Fresno County employment. Manufacturing accounts for 8.3 percent and 7.7 percent of employment in King and Fresno counties, respectively. Utilities employment is combined with trade and transportation jobs, and accounts for 12.6 percent and 16.7 percent of employment in King and Fresno counties, respectively (California EDD 2011).

NAS Lemoore dominates the Navy and Marine Corps Outlease Program with 16 farming entities, on average, leasing approximately 54 agricultural outleases on 12,776 acres (5,170 hectares). Revenues generated through the program at NAS Lemoore (estimated to be $1.3 million per year) are used to fund

natural resources management programs while the outleases provide farming entities additional land to perform agricultural activities that increase employment and generating revenue. In addition to the direct lease revenue, the NAS Lemoore Outlease Program results in services and land improvements valued at over $1 million dollars per year, which is an estimated combined value of approximately $180 per acre (NAS Lemoore 2014a).

Continuing drought conditions have had an impact on agricultural revenue and employment. The drought experienced in 2009 correlated to a total decline in revenue of $342.6 million as compared to 2008. These losses were felt most strongly along the west-side of the valley and especially in Kern County. Drought years can result in a loss of between 2,500 and 9,800 agricultural jobs throughout the San Joaquin Valley. Pumping restrictions 2009 also saw 268,500 acres (108,659 hectares) of agricultural land fallowed; 129,800 acres (52,528 hectares) are directly attributed to irrigation pumping restrictions (Michael et al. 2009).

The socioeconomic interplay between solar PV development and agricultural production is closely tied to drought. In years of drought, cumulative impact of solar PV development may be considered a socioeconomic benefit, as agricultural land that would otherwise be fallowed due to drought can still provide revenue to the region. However, during "wet" years, a solar PV project may preclude otherwise productive agricultural land from being used, which would also reduce potential agricultural employment and revenues in the region. Thus, in wet conditions, regional solar PV development may have a cumulative negative impact on socioeconomic conditions.

While the Proposed Action alone has the potential for adverse impacts to employment from the loss of agricultural positions, the majority of the past, present, and reasonably foreseeable future actions within the region include cumulative increases in local employment opportunities. These include both short-term construction opportunities with the multiple regional solar PV arrays being constructed, as well as long-term employment opportunities. The F-35C West Coast Homebasing project, which is currently underway, would have the biggest socioeconomic benefit, as the secondary employment impacts (i.e., those not directly associated with the F-35C Homebasing) are projected to total an estimated 471 jobs and an estimated $25.2 million in labor income (Navy 2014b). Therefore, Alternatives 1 or 2 would not have the potential to contribute appreciably to significant cumulative impacts to socioeconomics in conjunction with the impacts from other potentially cumulative actions.

4.4.5 VISUAL RESOURCES

The sites within the project area all have similar visual character, generally consisting of agricultural fields. The sites are flat with little topographic relief. The viewsheds from each site are similar, consisting of power lines, dirt access roads, agricultural fields, tree-lined windbreaks, distant mountains, and the NAS Lemoore Operations Area. Overall, the visual landscape of the area is rural with vast agricultural fields, roadways, and irrigation ditches dominating the visual setting.

Implementation of Alternatives 1 or 2 would alter the visual environmental from agricultural to a solar PV system. The solar PV system would be compatible with NAS Lemoore's visual character, and that of the surrounding area, which has several completed or planned solar PV projects. The new 230-kV transmission line would not change the context of the visual environment as several existing transmission lines are in the region.

This change in visual character from managed agriculture to solar PV system is consistent with regional development, where multiple solar PV projects are active, under construction, or proposed on previously or currently agricultural use lands. Therefore, Alternatives 1 or 2 would not have the potential to

contribute appreciably to significant cumulative impacts to visual resources in conjunction with the impacts from other potentially cumulative actions.

4.4.6 CULTURAL RESOURCES

The Proposed Action entails construction, operation, and decommissioning of a solar PV system on lands that are currently used for agricultural purposes and that are highly disturbed. The Proposed Action would not be likely to adversely affect any cultural resources. Three archaeological sites are located within the APE for Alternative 1 and Alternative 2: LPV-01, CA-KIN-0001116H, and CA-KIN-0001117H.

LPV-01, a historic trash scatter, is recommended not eligible for listing in the NRHP. Sites CA-KIN-0001116H (a historic utility line) and CA-KIN-0001117H (a portion of the San Joaquin Valley Railroad) bisect Sites A and B. CA-KIN-0001116H is comprised of nine utility poles that were once used to power the railroad crossing lights and bells on Reeves Boulevard (Garner and Waechter 2014). Only one of the nine utility poles, the easternmost, lies within the APE. This pole would be avoided during construction of the solar PV panels and the perimeter fence. No construction would occur at or adjacent to the San Joaquin Valley Railroad (site CA-KIN-0001117H), which runs through the APE.

Past, present, and future projects, including other solar PV system projects, have been, and would similarly be required to avoid or minimize direct and indirect effects to cultural resources. While the F-35C Homebasing effort does include the demolition of several buildings, California SHPO and NAS Lemoore have concurred that these buildings are not eligible for NRHP listing and that the impact to the cultural resources of NAS Lemoore from that project is less than significant. The region surrounding the project area is largely composed of agricultural land that is highly manipulated and disturbed, with a low likelihood of containing intact cultural resources. Therefore, Alternatives 1 or 2 would not have the potential to contribute appreciably to significant cumulative impacts to cultural resources in conjunction with the impacts from other potentially cumulative actions.

4.4.7 AIR QUALITY

4.4.7.1 Alternative 1: Construction, Operation, and Decommissioning of an up to 390 MW Solar PV System at Sites A and B

Sites A and B

The ROI in this air quality cumulative effects analysis includes the SJVAB. The minor impacts to air quality from Alternatives 1 or 2 that could contribute to potential cumulative impacts would be from the short-term air emissions from trucks and vehicles used during the construction of the project. Operational air emissions from proposed maintenance activities under Alternatives 1 or 2 would be negligible compared to the existing condition, and would not result in significant long-term increases in air emissions. In addition, during operations there would be a regional reduction in air emissions due to the reduction in the use of fossil fuels to produce electricity. The listed cumulative projects would also be required to conform to CAA General Conformity Rule requirements and/or the SJVAB SIP, and would not produce significant amounts of air emissions. Therefore, Alternatives 1 or 2 would not have the potential to contribute appreciably to significant cumulative impacts to air quality in conjunction with the impacts from other potentially cumulative actions.

4.4.7.2 Greenhouse Gasses Cumulative Effects Analysis

The potential effects of GHG emissions are by nature global and cumulative and it is impractical to attribute climate change to individual activities. Therefore, an appreciable impact on global climate change would only occur if GHG emissions associated with the Proposed Action or other alternatives

were to combine with such emissions from other man-made activities in such a way as to appreciably increase climate change impacts on a global scale. Table 4.4-1 summarizes the annual GHG emissions that would occur with implementation of Alternative 1.

Table 4.4-1. Estimated Annual GHG Emissions – Alternative 1

Scenario/Activity	Metric tons per year			
	CO_2	CH_4	N_2O	CO_2e[1]
Construction				
Year - 2016	3,102.57	0.78	0.00	3,119.03
Year - 2017	3,768.11	0.96	0.00	3,788.22
Year - 2018	3,102.57	0.78	0.00	3,119.03
Year - 2019	3,768.11	0.96	0.00	3,788.22
Decommissioning				
Year 2055	82.92	0.003	0.00	82.98

Note: [1]$CO_2e = CO_2 + (21 * CH_4) + (310 * N_2O)$.

Currently, there are no formally adopted or published NEPA thresholds of significance for GHG emissions. Therefore, in the absence of a formally adopted threshold of significance for GHGs, this EA compares GHG emissions that would occur from implementation of Alternative 1 to the U.S. net GHG baseline inventory of 2012 (the most recent information available) to determine the relative increase in proposed GHG emissions. Total annual CO_2e emissions in the U.S. were approximately 5.5 billion metric tons (USEPA 2014). Therefore, the CO_2e emissions resulting from the Proposed Action would amount to, at the most, approximately 0.00007% of the total CO_2e emissions generated by the U.S. In addition, the total annual GHG emissions would be well below the reference point of 25,000 metric tons of CO_2e proposed in the draft NEPA guidance by the CEQ (CEQ 2014).

Potentially cumulative projects in the vicinity of the Proposed Action (listed in Section 4.2) could also release a nominal amount of GHGs from construction and operation activities when compared to the total annual CO_2e emissions in the U.S., California, and NAS Lemoore. In addition, the Navy has taken a number of steps to reduce GHG emissions from their activities. These actions include developing energy efficient technologies and weapons systems, improving military and civilian vehicles fuel efficiency, utilizing alternative fuel vehicles and electric vehicles, improving energy efficiency at Navy facilities, and installing solar and other renewable energy sources at Navy facilities.

Long-term beneficial impacts to air quality would occur with implementation of the solar PV system due to the benefits of contributing to the energy/power grid through alternative energy development and reducing GHG. Alternative 1 in conjunction with the other past, present, and future solar energy projects would have a beneficial impact to the SJVAB as a whole due to the potential reduction in GHG as compared to burning fossil fuels for electricity generation. Therefore, when GHG impacts from Alternative 1 are added to the GHG impacts from the cumulative projects, there would not be significant GHG cumulative impacts to global climate change from implementation of Alternative 1.

4.4.7.3 Alternative 1 Option: Construction, Operation, and Decommissioning of a 20 MW Solar PV System at Site A

Table 4.4-2 summarizes the annual GHG emissions that would occur with implementation of the Alternative 1 Option.

Table 4.4-2. Estimated Annual GHG Emissions – Alternative 1 Option

Scenario/Activity	Metric tons per year			
	CO_2	CH_4	N_2O	CO_2e[1]
Construction				
Year - 2016	1,720.59	0.47	0.00	1,730.35
Year - 2017	1,831.81	0.49	0.00	1,842.11
Decommissioning				
Year 2053	80.03	0.003	0.00	80.09

Note: [1]$CO_2e = CO_2 + (21 * CH_4) + (310 * N_2O)$.

The potential GHG emissions under the Alternative 1 Option would be less than the potential emissions under Alternative 1; therefore, there would not be significant GHG cumulative impacts to global climate change from implementation of the Alternative 1 Option.

4.4.7.4 Alternative 2: Construction, Operation, and Decommissioning of an up to 390 MW Solar PV System at Sites A, B, D, and/or E

Table 4.4-3 summarizes the annual GHG emissions that would occur with implementation of Alternative 2.

Table 4.4-3. Estimated Annual GHG Emissions – Alternative 2

Scenario/Activity	Metric tons per year			
	CO_2	CH_4	N_2O	CO_2e[1]
Construction				
Year - 2016	2,943.22	0.74	0.00	2,958.77
Year - 2017	772.05	0.08	0.00	773.63
Year - 2018	2,943.22	0.74	0.00	2,958.77
Year - 2019	772.05	0.08	0.00	773.63
Decommissioning				
Year 2055	96.89	0.003	0.00	96.96

Note: [1]$CO_2e = CO_2 + (21 * CH_4) + (310 * N_2O)$.

The GHG effects from the implementation of Alternative 2 would be greater to those effects from Alterative 1. However, the potential GHG emissions would still be nominal as compared to the total annual CO_2e emissions in the U.S. Therefore, when GHG impacts from Alternative 2 are added to the GHG impacts from the cumulative projects, there would not be significant GHG cumulative impacts to global climate change from implementation of Alternative 2.

4.4.7.5 No Action Alternative

Under the No Action Alternative, no project activities would occur; therefore, there would be no GHG impacts to global climate change.

4.4.8 UTILITIES

The Western Area Power Administration provides electricity to NAS Lemoore. NAS Lemoore owns and maintains all transmission lines and related infrastructure within the installation boundaries. Average annual electricity consumption at NAS Lemoore from FY 2008 through FY 2010 was 89,688,410 kilowatt-hours (NAS Lemoore 2014b). The peak NAS Lemoore energy demand (which occurred a few years ago) was just less than 20 MW.

Implementation of Alternatives 1 or 2 would generate additional electricity for regional customers (Model 2) or for NAS Lemoore (Model 3) or a combination thereof (Models 2 and 3). Past, present, and

reasonably foreseeable future solar PV projects in the region would add an additional cumulative total of 319 MW potential electricity generation in the region. On-going transmission planning by the CAISO have identified and proposed upgrades to systems that require additional load requirements, and short- and long-term infrastructure needs throughout California. For example, the cumulative project, Central Valley Power Connect Project, proposes to construct a new 230-kV electrical transmission line connecting Gates Substation and Gregg Substation.

Historically, NAS Lemoore relied heavily on groundwater to meet the Station's—and the agricultural outleases—needs for irrigation. This reliance was matched by the surrounding agricultural region, and contributed to substantial groundwater mining of the aquifer. This mining continued until the CVP in the late 1960s brought surface water from northern California to the region for irrigation. By that time, groundwater mining had contributed to regional subsidence, i.e., the sinking of the surface as groundwater is removed and the ground settles into spaces that previously were saturated with water. NAS Lemoore experienced 10 feet (3 meters) of subsidence between 1926 and 1972. The CVP reduced the reliance of NAS Lemoore on groundwater resources, and thus subsidence was curtailed. Since the CVP, NAS Lemoore's rate of groundwater extraction has generally matched the natural rate of recharge of the aquifer, and the Station's use of groundwater has been to supplement surface water in drier years with poor surface water allocation (NAS Lemoore 2014a).

When a dry period stretches for multiple years, the natural recharge of the aquifer is diminished while the reliance on groundwater increases. Expanded cumulatively with other regional irrigators similarly returning to groundwater, the regional aquifer is under substantial stress as the water table continues to lower. This has also resulted in a return of subsidence concerns that have been specifically tied to periods of drought: 2 feet (0.6 meter) of subsidence were correlated with a drought in the early 1990s, while an additional half-foot of subsidence is believed to result directly from groundwater mining during the 2008-2010 drought period.

Climate change modelling predicts increased frequency of longer and more severe droughts in the region. Without substantial reduction of water demand in the region, the increase of drought combined with the agricultural practices of the region have the potential for substantial impacts to ground water supply and quality, as well as increase subsidence. Subsidence at NAS Lemoore has thus far occurred so slowly that it went unnoticed until measured. However, more rapid drawdown of the aquifer could speed subsidence to rates more likely to adversely impact NAS Lemoore.

The Proposed Action would remove agricultural land (the majority of which is irrigated) from production and install a solar PV system. The Proposed Action would have substantially lower water demands than active agriculture, and thus NAS Lemoore would need less water overall to irrigate. This trend of replacing productive agricultural land with solar PV projects is echoed by eight additional large-scale solar PV projects in the vicinity of NAS Lemoore. It is unknown to what degree the proposed solar PV projects would take irrigated land out of production (and thus decrease groundwater demand), however, it is likely that the cumulative result of these solar PV projects would be a regional net decrease in demand for water for irrigation. This would, in turn, reduce regional groundwater withdrawal and slow the regional rate of subsidence. Thus, the past, present, and reasonably foreseeable future solar PV projects, including the Proposed Action, would have a cumulative benefit to water supply and use. Therefore, Alternatives 1 or 2 would not have the potential to contribute appreciably to significant cumulative impacts to utilities in conjunction with the impacts from other potentially cumulative actions.

4.4.9 TRANSPORTATION

Regional access to the project area is provided primarily via California SR-198, which runs along a generally east/west alignment from Interstate 5 through the City of Lemoore. SR-198 extends along the southern boundary of NAS Lemoore and connects to local roads leading to the following four access gates: Main Gate, Operations Side Main Gate, Reeves Gate, and Avenal Gate. Secondary access to and from the project vicinity is provided by SR-41 and SR-269. Based on data collected by Caltrans (2013c) for roadway segments near NAS Lemoore, SR-198 has an existing average daily traffic volume of 12,600, while SR-41 and SR-269 have average daily traffic volumes of 17,300 and 3,600, respectively. Within Kings County, both SR-198 and SR-41 operate at LOS C or better near NAS Lemoore (Kings County 2006). Given the relatively low traffic volume, SR-269 is expected to operate at LOS B.

The past, present, and reasonably foreseeable future projects that have the potential to interact with Alternative 1 or Alternative 2 (and therefore could contribute toward cumulative impacts to transportation) include the Base Realignment of NAS Lemoore, Final EIS for Development of Facilities to Support Basing US Pacific Fleet FA-18E/F Aircraft on the West Coast, US Navy F-35C West Coast Homebasing, the EA for Strike Fighter Realignment at NAS Lemoore, and the SR-198/19th Avenue Interchange. The following paragraphs describe potential cumulative effects that may occur when the Proposed Action's impacts are taken together with those of the past, present, and reasonably-foreseeable future projects described above.

Base Realignment of NAS Lemoore, Final EIS for Development of Facilities to Support Basing US Pacific Fleet FA-18E/F Aircraft on the West Coast, and EA for Strike Fighter Realignment at NAS Lemoore

The Base Realignment of NAS Lemoore and the Final EIS for Development of Facilities to Support Basing US Pacific Fleet FA-18E/F Aircraft on the West Coast are past actions that occurred before 2015. Therefore, the operational traffic generated by these past projects is included in existing traffic counts, and associated impacts are accounted for in the description of the affected environment in Section 3.9. Accordingly, past projects would not contribute toward any cumulative effect on transportation that is not already accounted for in Section 3.9.

The EA for Strike Fighter Realignment at NAS Lemoore is a present project and the realignment is scheduled to occur between 2012 and 2015. As is the case for past actions, the traffic from this present action is accounted for by the assessment of the affected environment, and no additional cumulative impact to transportation would occur.

State Route 198/19th Avenue Interchange

Construction on SR-198/19th Avenue interchange in the City of Lemoore began in 2013 and is expected to conclude in early 2015. Trips to the construction site have increased traffic on SR-198 and the roadways of Kings County east of NAS Lemoore. However, construction is expected to be finished before the start of construction for Alternative 1 or Alternative 2. Therefore, interchange construction would not contribute toward any future cumulative impact to transportation.

The new interchange would increase capacity and improve access to various commercial and residential land uses that are accessed via 19th Avenue, which is located about 5 miles (8 kilometers) to the east of NAS Lemoore. This cumulative project would be expected to improve traffic flow and reduce existing delays and queues at this location. In addition, access improvements may induce some existing motorists to change their travel routes to take advantage of the new interchange. However, given the relatively low

volume of traffic generated by the Proposed Action, and considering the capacity benefits of this cumulative project, no significant cumulative effect would occur.

US Navy F-35C West Coast Homebasing

The homebasing of the F-35C at NAS Lemoore is a present project that would increase the number of personnel at NAS Lemoore by late 2016. Additional trips associated with the increase in personnel are anticipated to occur on SR-198 and the paved roadways within the fenced areas of NAS Lemoore throughout the day. A number of military construction projects are planned in support of the F-35C homebasing and construction will occur in the developed, fenced areas of NAS Lemoore, on both the Operations Side and Administrative Side. Construction would occur between 2014 and 2021 on a series of projects outlined in the NAS Lemoore Master Plan for the year 2030. The construction traffic associated with these military construction projects will also travel along SR-198, and the paved roadways leading to the access gates to the fenced areas of NAS Lemoore. Traffic increases associated with the military construction projects will also occur on Reeves Boulevard, Franklin Avenue, and Jackson Avenue, where both construction and operations traffic will approach the access gates to enter the restricted areas of NAS Lemoore. All vehicles will enter NAS Lemoore through the Main Gate, Reeves Gate, Operations Side Main Gate, and Avenal Gate. The F-35C homebasing at NAS Lemoore will not result in significant impacts to traffic and transportation from increases in personnel and associated traffic on local roads. Temporary increases in traffic associated with construction and demolition activities will occur, but no significant impacts to levels of service are anticipated (Navy 2014b).

For the Proposed Action, incremental increases in traffic on local and regional roadways would occur during the construction of either action alternative, but construction-related vehicles would proceed to the construction sites located outside the fence line, and would therefore not mix with traffic from the F-35C project at the access gates or the immediate approaches to them. Implementation of Alternative 1 or 2 would not contribute toward queues or delays at any access gate onto NAS Lemoore. Therefore, Alternatives 1 or 2 would not have the potential to contribute appreciably to significant cumulative impacts to transportation in conjunction with the impacts from other potentially cumulative actions.

CHAPTER 5
OTHER NEPA CONSIDERATIONS

5.1 POSSIBLE CONFLICTS BETWEEN THE PROPOSED ACTION AND ALTERNATIVES, AND THE OBJECTIVES OF FEDERAL, STATE, LOCAL AND REGIONAL LAND USE PLANS, POLICIES AND CONTROLS.

An assessment of the Proposed Action indicates that neither Alternative 1 nor Alternative 2 would conflict with the objectives of other regulations. A summary of regulatory compliance status is presented in Table 5-1.

Table 5-1. Summary of Applicable Environmental Regulations and Regulatory Compliance

Plans, Policies, and Controls	Regulatory Authority	Compliance status	EA Section
NEPA	Navy	This EA has been prepared in accordance with NEPA, CEQ regulations implementing NEPA, and Navy NEPA procedures.	Entire EA
CAA, CAAQS, SJVAPCD Rules and Regulations for Title V and non-Title V sources	USEPA and CARB	The air quality analysis in this EA concludes that proposed emissions under Alternatives 1 and 2: 1) would not exceed *de minimis* levels, 2) would not create a major regional source of air pollutants or affect the current attainment status at NAS Lemoore, and 3) would comply with all applicable state and regional air agency rules and regulations. A RONA has been prepared (Appendix B).	3.7, 4.3.7
EO 12898, Environmental Justice	Navy	Neither Alternative 1 nor 2 would result in disproportionately high and adverse human health or environmental effects on minority populations and low-income populations.	1.5.2.2
EO 13045, Protection of Children from Environmental Health Risks and Safety Risks	Navy	Neither Alternative 1 nor Alternative 2 would result in environmental health risks and safety risks that may disproportionately affect children.	1.5.2.2
NHPA	SHPO	None of the archeological sites within the project area are eligible for listing under the NRHP. The Navy has requested the SHPO concur with a finding of "No Historic Properties Affected" finding (Appendix A).The Navy has initiated consultation with Tribal Governments.	3.6, 4.3.6
Clean Water Act	USEPA, U.S. Army Corps of Engineers, and California State Water Resources Control Board	Alternatives 1 or 2 would be implemented in compliance with California's General Construction Permit. Proposed construction and decommissioning activities would require preparation of a Stormwater Pollution Prevention Plan and use of BMPs to limit potential erosion and runoff.	1.5
ESA	USFWS	Neither Alternative 1 nor Alternative 2 would affect ESA-listed species or suitable habitat for ESA-listed species at NAS Lemoore. Critical habitat has not been designated on NAS Lemoore. Coordination with the USFWS is ongoing.	3.2, 4.3.2
Migratory Bird Treaty Act	USFWS	Neither Alternative 1 nor Alternative 2 would increase impacts to migratory birds.	3.2, 4.3.2
Farmland of Statewide Importance	Natural Resources Conservation Service	Alternatives 1 or 2 would temporarily impact farmland of statewide importance. No long-term conversion would occur.	3.1, 4.4.1

5.2 ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL OF VARIOUS ALTERNATIVES AND MITIGATION MEASURES CONSIDERED

Energy demands would primarily occur during the construction/decommissioning phases of the project. The energy demands for the implementation of Alternative 1 or Alternative 2 are identical. The Alternative 1 Option, having a smaller footprint, would have lower energy demands.

Construction/decommissioning activities would consume large volumes of nonrenewable fossil fuel, in the form of diesel gasoline, for the operation of construction equipment. One of the primary opportunities for conservation of fuel is the regular maintenance of vehicles and equipment to maximize their fuel efficiency. All equipment would be in proper working order. Equipment would not be allowed to idle when not in service, as is required for minimizing air quality impacts. In addition, all equipment would be shut down when not in operation for any extended periods of time.

Maintenance activities would require a small number of vehicles. In addition to the conservation options described above, fuel consumption could be further reduced by using a fuel efficient vehicle fleet, and limiting the use of less efficient vehicles and equipment to when they are required by the situation. Once operational, the Proposed Action would be net energy producer for the region.

5.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

NEPA requires that environmental analysis include identification of "…any irreversible or irretrievable commitments of resources that would be involved if the Proposed Action is implemented." The term "resources" (both renewable and nonrenewable) means the natural and cultural resources committed to, or lost by, the action, as well as labor, funds, and materials committed to the action.

The permanent use and subsequent loss of non-renewable resources, such as oil, natural gas, and iron ore, are considered irreversible because non-renewable resources cannot be replenished by natural means. An action that causes a loss in the value of an affected resource, which cannot be restored (e.g., disturbance of a cultural site), is considered an irretrievable commitment of resources. Similarly, the consumption of a renewable resource that would be lost for a period of time is also considered an irretrievable commitment of resources. Renewable natural resources include water, lumber, and soil, all of which can be replenished by natural means within a reasonable timeframe. Alternative 1 and Alternative 2 would both require the irretrievable commitments of both non-renewable and renewable resources in the use of fuel, construction materials, and labor. The operation and maintenance of the solar PV system would require fuel and certain types of materials.

The Proposed Action would comply with EO 13693, *Planning for Federal Sustainability in the Next Decade*. EO 13693 superseded EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*, and EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*. The goal of EO 13693 is to maintain federal leadership in sustainability and greenhouse gas emission reductions.

Both Alternative 1 and Alternative 2 would require a similar amount of construction materials and energy; the smaller footprint of the Alternative 1 Option would equate to a similarly smaller construction material and energy demand. The total amount of construction materials (e.g., concrete, insulation, wiring) required for the Proposed Action is relatively small when compared to the resources available in the region. The construction materials and energy required for facility development and operations are not in short supply. Moreover, the use of construction materials and energy would not have an adverse impact on the continued availability of these resources. The commitment of energy resources to implement the Proposed Action would not be excessive in terms of region-wide usage. Furthermore, compliance with EO 13693 requirements would minimize irreversible or irretrievable effects to multiple non-renewable and renewable resources, while implementation of the action alternatives would further the goals and intentions of EO 13693 by increasing the amount of energy generated and/or used at NAS Lemoore that is derived from renewable sources.

5.4 RELATIONSHIP BETWEEN SHORT-TERM ENVIRONMENTAL IMPACTS AND LONG-TERM PRODUCTIVITY

Short-term uses of the environment associated with the Proposed Action would include the elimination of vegetative ground cover and termination of agricultural operations at the project sites. Project-related construction activities would temporarily increase air pollution emissions in the immediate vicinity of the affected area(s). Sustainability principles would be incorporated into building design and practices in accordance with NAVFAC Instruction 9830.1, Sustainable Development Policy (Navy 2003).

As discussed in Chapter 3, the action alternatives would result in both short- and long-term environmental effects. Construction, operation, and decommissioning of the solar PV system is unlikely to result in the types of impacts that would reduce environmental productivity, have long-term impacts on sustainability, affect biodiversity, or narrow the range of long-term beneficial uses of the environment.

The Proposed Action has a defined lifecycle in which long term, i.e., more than 30 years post-implementation, the project area would be returned to existing conditions and functioning with minimal net change from the pre-project environment. In the interim, however, agricultural and biotic productivity within the affected agriculture parcels would be eliminated, while renewable energy benefits would realized.

5.5 ANY PROBABLE ADVERSE ENVIRONMENTAL EFFECTS THAT CANNOT BE AVOIDED AND ARE NOT AMENABLE TO MITIGATION

No resource area would be subject to significant adverse impacts that would require mitigating. Table 3.0-1 presents the identified resource area avoidance/minimization measures for the alternatives. No adverse environmental effects would occur.

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CHAPTER 6
LIST OF AGENCIES AND PERSONS CONTACTED

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CHAPTER 7
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Claudia Tan, Solana Beach, CA
Document Production Manager, 12 years of experience

Ian Todd, Solana Beach, CA
Land Use, Visual, and Utilities, 5 years of experience

Terry Rudolph, Boise, ID
Cultural Resources, 35 years of experience

Bob Wardwell, Middletown, CT
Quality Assurance Review, 40 years of experience

Lisa Woeber, Solana Beach, CA
Technical Review, 8 years of experience

CHAPTER 8
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Appendix A
Public and Agency Correspondence

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DEPARTMENT OF THE NAVY
NAVAL AIR STATION LEMOORE
700 AVENGER AVENUE
LEMOORE, CA 93246-5001

IN REPLY REFER TO:
5090
Ser N45/055
April 15, 2015

Dr. Carol Roland-Nawi
State Historic Preservation Officer
OFFICE OF HISTORIC PRESERVATION
1725 23rd Street, Suite 100
Sacramento, CA 95816

Dear Dr. Roland-Nawi:

SUBJECT: PHOTOVOLTAIC SYSTEM, NAVAL AIR STATION (NAS) LEMOORE

The Navy is proposing an undertaking to install a photovoltaic (PV) system at Naval Air Station (NAS) Lemoore, Kings County, California. There are four alternative locations proposed for this project (Area A, Area B, Area D, and Area E) and under one scenario all four locations would be required for the installation of the photovoltaic system. All four of the areas are within the agricultural fields and up to 5,728 acres (2,318 hectare) of land would be developed for the PV system.

In accordance with 36 CFR 800, regulations implementing Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended (16 USC 470s), the Navy is providing: a) description of the proposed undertaking; b) proposed Areas of Potential Effects (APE) for areas A, B, D, and E; c) identification of historic properties; and d) the Navy's determination of *No Historic Properties Affected* in accordance with 36 CFR 800.4(d).

DESCRIPTION OF UNDERTAKING

An undertaking is proposed to install a PV system at NAS Lemoore. The purpose of the project is to increase Navy installation energy security, operational capability, strategic flexibility and resource availability through the development of renewable energy generating assets at Navy installations by the construction and operation of a solar PV system at NAS Lemoore. The project is required to meet the renewable energy standards put forth by the 1 Gigawatt Initiative, Executive Order 13514, and Secretary of the Navy Energy Goals.

A 390 Megawatt (MW) ground mounted photovoltaic system is proposed at four locations at NAS Lemoore. The ground mounted panels would include site preparations: grading to bare mineral soil to remove vegetation at all areas within the APE, installation of underground electrical lines and circuitry (3 feet deep as required by UFC codes), and trenching between panels to complete the electrical circuits. The facilities to be constructed include solar photovoltaic panels, steel tracking structure, inverters, combiner boxes, electrical switchgear, a substation, a switching/metering station, transmission lines, associated electrical wiring, connections, and other items required for the PV system. All electrical equipment, including inverters and transformers would be constructed on concrete pads and all solar PV wiring would

be routed underground. Gravel roads would be graded between the rows of solar PV panels and around the site perimeter for maintenance access. No access improvements would be required as part of this project because the road network adjacent to the project area is sufficient. The areas associated with the existing transmitter areas within Site B would be avoided; no construction in these areas would occur. The ground mounted systems would be enclosed by chain link panels with barbed-wire outriggers in accordance with force protection standards. It is also a safety issue to provide perimeter fencing so individuals cannot enter the solar fields.

A typical configuration for this type of installation is to affix the solar PV panels atop constructed mounting structures, mounted on posts bored into the ground, or be placed on concrete block above ground. Foundations for the mounting structures would be built on engineered fill or native soil at a minimum of 24 inches below adjacent grade or finished grade. Each pole footing would consist of a 4-inch cross-sectional area and would require a depth of 4 to 6 feet (1.2 to 1.8 meters) below ground surface.

A 400 Megavolt ampere (MVA) substation would also be constructed. The substation would cover approximately 1.8 acres (0.7 hectare) and would serve as the interface connection of the solar PV field to the existing Pacific Gas & Electric (PG&E) 230-kilovolt (kV) transmission line. A 230-kV switching/metering station would also be constructed. The switching/metering station would cover approximately 8,100 square feet (750 square meters) and would meter the solar PV power generated. Finally, a switching station covering approximately 0.5 acre (0.2 hectare) would be constructed adjacent to the existing equestrian center to transfer electrical power generated to the existing PG&E 230-kV transmission line. A graveled buffer area would be developed around the switching station and a fence would be constructed to restrict access to the site. The depth of disturbance for the three support structures is not expected to be below 6 feet (1.8 meters).

The existing 69-kV transmission line would not have capacity for the electricity generated therefore a new 230-kV transmission line would be constructed to the existing PG&E 230-kV transmission line. To support the new 230-kV transmission line, approximately one hundred, 80-foot (24-meter) tall steel poles would be constructed along the proposed route. Power would be delivered via the existing PG&E 230-kV transmission lines to the PG&E Henrietta substation. The west-east segment of the 230-kV transmission line would be underground to avoid encroachment on the existing flight easement. The flight easement does not allow vertical structures above 25 feet (8 meters) tall. Upon clearing the easement, the transmission line would run above ground along the eastern boundary of Sites A and/or B, then east to tie into the existing PG&E 230-kV transmission line.

At all locations, typical maintenance would consist of hosing down the panels twice a year. For systems of these sizes, work would be performed by one or two person(s) using a mobile water truck. At the conclusion of the agreement, the solar PV system would be decommissioned and the site returned to its pre-project condition.

AREA OF POTENTIAL EFFECT

Consistent with 36 CFR 800.16(d), the APE for this project is defined as the geographic area within which the proposed undertaking may directly cause effects to historic properties. Enclosure (1) is a location map for NAS Lemoore. Enclosure (2) depicts the APE for Areas A, B, D, and E. All four locations encompass the project area and construction lay-down areas.

The project would consist of a 390 MW ground-mounted photovoltaic system on 5,728 acres (2,318 hectare) located within the agricultural fields surrounding the airfield at NAS Lemoore. The vertical depth of disturbance for the proposed undertaking is not expected to exceed 6 feet (the depth of previous recorded disturbances due to agricultural activities). The APE map depicts multiple substations and switching/metering stations. These refer to the location of these structures under different scenarios and in the end only one location for each structure will be chosen.

IDENTIFICATION OF HISTORIC PROPERTIES

Records Search

A complete cultural resources records search of NAS Lemoore was carried out in March 2010 and an updated records search was conducted on the eastern side of the Operations Area in 2014. In addition, the NAVFAC SW archaeologist checked through the base records for any additional information that might not have been included in the records search. The records searches indicated 32 cultural resource studies have been conducted within a one mile radius of the base, five of which fall within the APE. The record searches identified one archaeological site and four isolates recorded within the boundary of the base. The archaeological resources include one historic waste scatter, CA-KIN-74H (P-16-000081), and three prehistoric isolates, P-16-000082, P-16-000083, and GH-1. None of these resources are located within or adjacent to the APE.

Previous Studies

As a part of the 1997 Historic and Archaeological Resource Protection (HARP) study, NAS Lemoore was divided into five possible sensitivity zones for archaeological resources: High Sensitivity Zones 1 through 4, occupying a total of 760 acres (307 hectares), and a Low Sensitivity Zone, occupying the remaining 17,611 acres (7,126 hectares) (Milliken and Mikesell 1997). In 1999, it was determined that the 1997-2002 HARP Plan's conclusion of high sensitivity zones and potential buried sites was only based on a small number of surface surveys and studies conducted in other parts of the San Joaquin Valley, and sensitivity should be reassessed (Milliken and Young 2000).

In 1999, 220 acres (89 hectares) within what was considered to be high sensitivity areas was sample surveyed. Sensitivity Zone 4 was only subject to a cursory reconnaissance survey because agricultural activities had completely altered the natural landscape, and an intensive survey would not have proven useful. Sample areas from Zones 1, 2, and 3 were subject to an

intensive level survey. As a result of the fieldwork, one historic refuse scatter (CA-KIN-74H) and two prehistoric isolates (P-16-000082 and -000083) were identified. The survey resulted in a reduction of the original 760 acres (307 hectares) of high sensitivity to 138 acres (56 hectares) of what was reclassified as medium sensitivity. In addition to the archaeological sample survey, a geomorphological trenching program was conducted to confirm the presence of an alluvial fan, which could indicate the existence of buried archaeological sites. The trenching results indicated that portions of NAS Lemoore are underlain by buried terminal Pleistocene soil surfaces. While it is always possible that buried archaeological sites may exist within the Station, the chance of encountering a buried site is quite low (Milliken and Young 2000). As a result of the 1999 fieldwork, two significant conclusions were reached: 1) "there is no longer any acreage delimited having high sensitivity for prehistoric archaeological sites at the Station" and 2) "the likelihood of encountering a buried prehistoric site on the Station during an undertaking is so low that archaeological monitoring is not regularly recommended" (Milliken and Young 2000: i).

Today, more than two-thirds of the land in NAS Lemoore is utilized for agricultural purposes, and has been leased to local farmers. Ground-disturbing agricultural activities include cultivation, well drilling, irrigation, drainage ditch construction, sump construction, and three-four foot deep soil ripping to break up hardpans (Milliken and Young 2000).

Archaeological Survey

A conference call between NAVFAC SW and SHPO was held on November 15, 2012 to discuss a strategy to survey the agricultural parcels on NAS Lemoore. It was determined that a minimum of 25 percent of each parcel should be surveyed, including any areas that are not normally plowed (roads, ditches, etc.), and that disturbances will not be greater than previous recorded disturbances.

In 2012 and 2013, Far Western conducted a Phase 1 archaeological survey of Sites D and E. The survey in 2012 was completed at 100 percent ground coverage and the survey in 2013 was completed at 64 percent ground coverage. The 2012 survey report was sent on May 23, 2012 as part of the consultation for the FY13 Agricultural Outlease Advertisement Project. SHPO concurred on July 12, 2012. The 2013 survey report was sent on March 24, 2015 as part of the consultation for the FY15 Agricultural Outlease Advertisement of 14 Leases Project. The Navy is currently waiting for SHPO to respond to the letter.

In 2014, Cardno, Inc. conducted a Phase 1 archaeological survey of Sites A and B. The survey was completed at 100 percent ground coverage. The 2014 survey report was sent on March 24, 2015 as part of the consultation for the FY15 Agricultural Outlease Advertisement of 14 Leases Project. The Navy is currently waiting for SHPO to respond to the letter.

FINDINGS

The 2012 Phase 1 archaeological survey by Far Western identified no historic resources. The 2013 Phase 1 Archaeological survey identified 7 isolated artifacts and 2 historic resources.

Three of the isolates are located within the APE; however isolated artifacts can provide little information beyond what has already been collected and is considered ineligible for the NRHP. The two sites that were recorded are P-16-000277 a segment of a utility line and P-000122 a segment of the San Joaquin Valley Railroad. Both of these sites are located adjacent to the APE and will not be affected by the proposed photovoltaic system. The Phase 1 archaeological survey by Cardno, Inc. identified one new site and 8 isolated artifacts. All 8 of the isolated artifacts are located within the current APE; however isolated artifacts can provide little information beyond what has already been collected and is considered ineligible for the NRHP. The archaeological site that was recorded is located within the APE and is a historic trash scatter likely dating to the early to the mid-20th century. Cardno, Inc. evaluated the site for listing in the NRHP under the four criteria and recommend that the site is ineligible for listing. NAVFAC SW has previously requested that the CA SHPO concur with the finding that historical archaeological site LPV-01 is not eligible for listing in the National Register as part of the FY15 Agricultural Outlease Advertisement of 14 Leases Project at NAS Lemoore.

Based on the information presented above, the archaeological surveys determined that the APE has been completely disturbed due to previous agricultural activities, that all ground disturbances resulting from the new photovoltaic system will not exceed 6 feet (1.8 meters) (the depth of previous recorded disturbances of previous agricultural activities), and that based on land use since the early 20th century and the geomorphology of the vicinity, encountering archaeological deposits within 7 feet (2 meters) of the surface represents a low probability (see Milliken and Young's 2000 report – Surface Reconnaissance, Geomorphological Analysis, and Reassessment of Archaeological Sensitivity Zones at Naval Air Station, Lemoore. Report on file at NAS Lemoore). It is the Navy's recommendation that due to the information presented above, the likelihood of encountering intact archaeological deposits for the new photovoltaic system is very low.

In the event of a discovery during any excavation the contractor will be required to immediately stop work in the area of the discovery and immediately notify the Navy of the discovery. The Navy will have the discovery site evaluated by a professional archeologist, and in consultation with the SHPO, if the discovery is determined to qualify for listing on the NRHP, the Navy will develop and implement an appropriate treatment plan before authorizing the excavation or construction responsible for the discovery to proceed.

NATIVE AMERICAN CONSULTATION

Native American consultation is being initiated concurrent with this letter submission. All relevant tribes listed below in the "Copy to" section are being contacted.

5090
Ser N45/055
April 15, 2015

REQUEST FOR CONCURANCE

Based on the results of the records search and field investigation, the Navy respectfully requests your concurrence with the definition of the APE and the finding of "No Historic Properties Affected" in accordance with 36 CFR 800.4(d) within 60 days of receipt of this correspondence for the photovoltaic system at NAS Lemoore. If you have any questions or need additional information, please contact NAVFAC SW archaeologist Mr. Joseph Baumann by email at joseph.baumann@navy.mil or by phone at 619-532-2787. In addition, please send a PDF copy of the response letter to Mr. Baumann at the e-mail address stated above.

Sincerely,

MARK P. PATTERSON
Environmental Compliance Branch Manager
By direction of the Commanding Officer

Enclosures: 1. Project Location Map
2. APE Map

Copy to: Picayune Rancheria Chukchansi Indians
46575 Road 417 #A
Coarsegold, California 93614

Tachi-Yokut Tribe-Santa Rosa Rancheria
P.O. Box 8
16835 Alkali Dr.
Lemoore, CA 93245

Cold Springs Rancheria Tribe
P.O. Box 209
Tollhouse, CA. 93667

Big Sandy Rancheria of Mono Indians
37387 Auberry Mission Road
Auberry, CA 93602

Table Mountain Rancheria Tribe
23736 Sky Harbour Rd
Friant, CA 93626

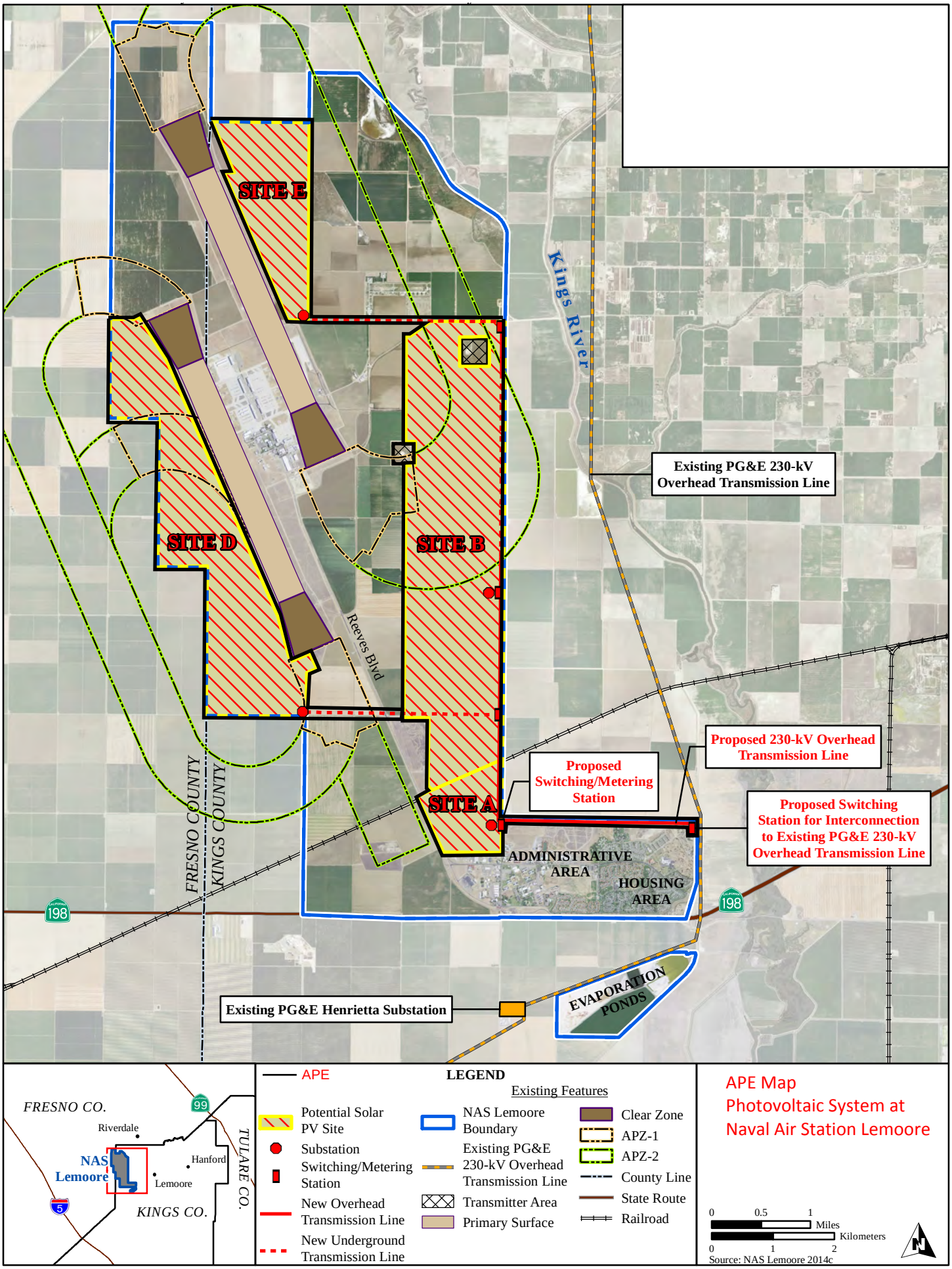
5090
Ser N45/055
April 15, 2015

Tule River Indian Tribe
340 North Reservation Road
Porterville, CA 93257

North Fork Rancheria Tribal Office
P.O. Box 929
North Fork, CA 93643

Project Location Map

Enclosure 1



APE Map
Photovoltaic System at
Naval Air Station Lemoore

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Appendix B
RONA and Air Quality Calculations

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DRAFT
RECORD OF NON-APPLICABILITY (RONA) FOR CLEAN AIR ACT CONFORMITY

PROPOSED CONSTRUCTION, OPERATION, AND DECOMMISSIONING OF A SOLAR PHOTOVOLTAIC SYSTEM AT NAVAL AIR STATION, LEMOORE

SAN JOAQUIN VALLEY AIR BASIN

INTRODUCTION

The U.S. Environmental Protection Agency (USEPA) published *Determining Conformity of General Federal Actions to State or Federal Implementation Plans; Final Rule* in the 30 November 1993, Federal Register (40 Code of Federal Regulations [CFR] Parts 6, 51, and 93). The U.S. Department of the Navy (Navy) published *Clean Air Act (CAA) General Conformity Guidance* in OPNAVINST 5090.1D dated 30 October 2007 and the Navy guidance for compliance with the CAA General Conformity Rule, dated 30 July 2013. These publications provide implementing guidance to document CAA Conformity Determination requirements.

Federal regulations state that no department, agency, or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license to permit, or approve any activity that does not conform to an applicable implementation plan. It is the responsibility of the Federal agency to determine whether a Federal action conforms to the applicable implementation plan, before the action is taken (40 CFR Part 1, Section 51.850[a]).

The General Conformity rule applies to federal actions proposed within areas which are designated as either nonattainment or maintenance areas for a National Ambient Air Quality Standard (NAAQS) for any of the criteria pollutants. Former nonattainment areas that have attained a NAAQS are designated as maintenance areas. Emissions of pollutants for which an area is in attainment are exempt from conformity analyses.

The project would occur within the San Joaquin Valley Air Basin (SJVAB). This portion of the SJVAB is currently in extreme nonattainment of the 8-hour ozone (O_3) NAAQS and is in nonattainment of the 24-hour and annual fine particulate matter ($PM_{2.5}$) NAAQS. The SJVAB is a maintenance area for particulate matter less than or equal to 10 microns in diameter (PM_{10}) NAAQS, and is attainment of the sulfur dioxide (SO_2) and carbon monoxide (CO) standards. Although the air basin is in attainment of the SO2 NAAQS, annual SO2 emissions are analyzed because they are a major precursor to ambient $PM_{2.5}$. Therefore, only project emissions of $PM_{2.5}$, PM_{10}, SO_2, O_3 (or its precursors, volatile organic compounds [VOCs] and oxides of nitrogen [NO_x]) are analyzed for General Conformity Rule applicability.

The annual *de minimis* levels for this region are 10 tons of VOC and NO_x, and 100 tons of $PM_{2.5}$, PM_{10}, and SO_2, as listed in Table 1. Federal actions may be exempt from conformity determinations if they do not exceed designated *de minimis* levels (40 CFR Part 1, Section 51.853[b]).

Table 1. Conformity *de minimis* Levels for Criteria Pollutants in the San Joaquin Air Basin

Criteria Pollutant	*De minimis Level (tons/year)*
Volatile Organic Compounds (VOC)	10
Oxides of Nitrogen (NO_x)	10
Sulfur Dioxide (SO_2)	100
Fine Particulate Matter ($PM_{2.5}$)	100
Particulate Matter (PM_{10})	100

PROPOSED ACTION

Action Proponent: Naval Air Station (NAS) Lemoore

Location: Kings and Fresno Counties, California

Proposed Action Name**:** Proposed Construction, Operation, and Decommissioning of a Solar Photovoltaic System at Naval Air Station Lemoore, California

Proposed Action & Emissions Summary: Under the Proposed Action, the Navy and a private partner would enter into an agreement to allow the private partner to use Navy land to construct, operate, and own a proposed solar PV system. The partner would sell the generated power to regional customers and/or the Navy. The private partner would be responsible for maintenance, operation, and the eventual decommissioning of the solar PV system.

Under Alternative 1, an up to 390 MW solar PV system would be constructed and operated at Sites A and B (2,730 acres) at NAS Lemoore. At the end of the agreement, the solar PV system would be decommissioned and the site returned to its pre-project condition. An Alternative 1 Option has also been identified and analyzed: construction and operation of a 20 MW solar PV system at Site A (145 acres). Under Alternative 2, an up to 390 MW solar PV system would be constructed and operated on up to 2,730 acres at Sites A, B, D, and/or E. At the end of the agreement, the solar PV system would be decommissioned and the site returned to its pre-project condition.

Estimated emissions due to implementation of the Proposed Action are shown in Tables 2, 3, and 4. Based on the air quality analysis for each alternative, estimated emissions would be below conformity *de minimis* levels.

Table 2. Estimated Emissions Resulting from Implementation of Alternative 1

Emissions Activity Per Year	*Air Pollutant Emissions (tons)*					
	VOCs	***NO_x***	***CO***	***SO_2***	***PM_{10}***	***$PM_{2.5}$***
Construction						
2016 Total Emissions	0.55	1.98	17.11	0.03	2.00	0.74
2017 Total Emissions	0.63	2.69	20.87	0.04	0.67	0.23
2018 Total Emissions	0.55	1.98	17.11	0.03	2.00	0.74
2019 Total Emissions	0.63	2.69	20.87	0.04	0.67	0.23
Decommissioning						
Year – 2055	0.37	0.15	0.36	0.0009	0.04	0.009
Conformity *de minimis* threshold	10	10	NA	100	100	100
Exceeds Conformity *de minimis* threshold?	No	No	NA	NA	No	No

Note: NA = not applicable.

During the proposed construction and decommissioning activities, proper and routine maintenance of all vehicles and other construction equipment would be implemented to ensure that emissions are within the design standards of all construction equipment. Construction equipment with combustive engines would meet the USEPA's Tier 4 emission standards, as practicable to do so. Dust suppression methods (such as using water trucks to wet the construction/decommissioning area) would be implemented to minimize fugitive dust emissions. After construction activities have occurred, a soil stabilizer would be applied to unvegetated soil, and gravel would be placed on access roads between the rows of solar PV panels and around the site perimeter (outside of the fence line).

Operational emissions from maintenance and repair activities would be minor and infrequent. Emissions would be generated from operational activities such as the use of vehicles and equipment with combustive engines, and generation of fugitive dust when driving vehicles on unpaved surfaces within and around the solar PV system. On a region-wide scale, the use of solar PV panels would have beneficial air quality impacts because fossil fuels would not be used for the necessary electricity generation, resulting in fewer air emissions (including GHG and criteria pollutant emissions). Providing solar energy to NAS Lemoore or the region would have long-term direct and indirect benefits to air quality in the SJVAB.

Table 3. Estimated Emissions Resulting from Implementation of the Alternative 1 Option

Construction Activity Per Year	***Air Pollutant Emissions (tons)***					
	VOCs	***NO_x***	***CO***	***SO_2***	***PM_{10}***	***$PM_{2.5}$***
Construction						
2016 Total Emissions	0.27	1.07	9.84	0.02	1.14	0.56
2017 Total Emissions	0.29	1.31	10.64	0.02	0.20	0.08
Decommissioning						
Year – 2053	0.04	0.14	0.34	0.001	0.01	0.01
Conformity *de minimis* threshold	10	10	NA	100	100	100
Exceeds Conformity *de minimis* threshold?	No	No	NA	NA	No	No

Note: NA = not applicable.

BMPs proposed under Alternative 1 would also be implemented under the Alternative 1 Option (e.g., routine maintenance of construction equipment, use of water trucks to lessen fugitive dust). The operational air emissions from the Alternative 1 Option would be similar as Alternative 1, but would be lessened because of the reduced scope of the project under the Option. The project would still have a beneficial impact to the SJVAB as a whole due to the potential reduction in GHG as compared to burning fossil fuels for electricity generation, but the beneficial impact would be smaller compared to as Alternative 1.

Table 4. Estimated Emissions Resulting from Implementation of Alternative 2

Construction Activity Per Year	***Air Pollutant Emissions (tons)***					
	VOCs	***NO_x***	***CO***	***SO_2***	***PM_{10}***	***$PM_{2.5}$***
Construction						
2016 Total Emissions	0.58	2.22	17.30	0.035	2.55	0.82
2017 Total Emissions	0.72	3.36	20.86	0.042	0.71	0.28
2018 Total Emissions	0.58	2.22	17.30	0.035	2.55	0.82
2019 Total Emissions	0.72	3.36	20.86	0.042	0.71	0.28
Decommissioning						
Year – 2055	0.04	0.13	0.33	0.001	0.07	0.01
Conformity *de minimis* threshold	10	10	NA	100	100	100
Exceeds Conformity *de minimis* threshold?	No	No	NA	NA	No	No

Note: NA = not applicable.

BMPs proposed under Alternative 1 would also be implemented under Alternative 2 (e.g., routine maintenance of construction equipment, use of water trucks to lessen fugitive dust). The operational air emissions from Alternative 2 would be as described for Alternative 1. The regional beneficial impact would be the same as under Alternative 1.

Affected Air Basin: San Joaquin Valley Air Basin

Date RONA Prepared: 24 April 2015

RONA Prepared By: Cardno

PROPOSED ACTION EXEMPTION(S)

The Proposed Action is located within a nonattainment and maintenance area; therefore, the Proposed Action is subject to the General Conformity Rule requirements. Because project emissions would be below *de minimis* thresholds, the project has demonstrated conformity with the requirements of the General Conformity Rule, and a formal CAA Conformity Determination is not required.

ATTAINMENT AREA STATUS AND EMISSIONS EVALUATION CONCLUSION

The SJVAB is an extreme nonattainment area for the 8-hour federal O_3 standard; VOCs and NO_x are precursors to the formation of O_3.The SJVAB is in nonattainment of the 24-hour and annual $PM_{2.5}$ standard, and is considered a maintenance area for the federal PM_{10} standard.

Emissions associated with the Proposed Action were calculated using data presented in Chapter 2 of the EA, project design details, general air quality assumptions, and modeled using the California Emissions Estimator Model, which is the current air quality model for land use projects in California.

The Navy concludes that *de minimis* thresholds for applicable criteria pollutants would not be exceeded as a result of implementation of Alternative 1 or Alternative 2. The emissions data supporting that conclusion are shown in Tables 2 through 4, which is a summary of the calculations, methodology, and data included in Appendix B. Therefore, the Navy concludes that formal CAA Conformity Determination procedures are not required, resulting in this RONA.

RONA APPROVAL

To the best of my knowledge, the information presented in this RONA is correct and accurate, and I concur in the finding that implementation of the Proposed Action does not require a formal CAA Conformity Determination.

_____ _____

[Name] [Date]

NAS Lemoore Solar PV System - Alternative 1 - Construction - Phase One

San Joaquin Valley Air Basin, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	58.54	1000sqft	1.34	58,544.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	45
Climate Zone	3			**Operational Year**	2016
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Phase Two would have the same project characteristics and air emissions

Land Use - General Light Industry was chosen as the closest Land Use Type option. "Unit amount" = half of the proposed "construction" (substation + s/m station + switching station + trans poles; assumed PV panels constructed offsite).

Construction Phase - No demolition, paving, or architectural coating phases. Two construction phases; each phase to last 2 years. Assumed 4 months site prep, 4 months grading, 16 months construction.

Off-road Equipment - "Other general construction equipment" = pile drivers and "Off-highway trucks" includes water trucks.

Off-road Equipment - "Off-highway trucks" = includes water trucks.

Off-road Equipment - "Off-highway trucks" = water trucks.

Grading - Each two-year construction phase assumed to disturb half of the 2,730 acres on which the PV system will be placed, and assumed that 50% of the site would be graded. All cut/fill to remain onsite.

Trips and VMT - Vendor trips include water truck trips to and from the site.

Land Use Change - Assume that existing cropland will be removed.

Construction Off-road Equipment Mitigation - Assume latest engine technology.

NAS Lemoore Solar PV System - Alternative 1 - Construction - Phase One

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2016	2.8128	28.8102	20.0078	0.0345	3.6298	1.3436	4.9734	1.3514	1.2404	2.5918	0.0000	3,102.5695	3,102.5695	0.7838	0.0000	3,119.0287
2017	3.2477	32.7132	22.3746	0.0425	0.6003	1.5346	2.1349	0.1602	1.4209	1.5811	0.0000	3,768.1120	3,768.1120	0.9579	0.0000	3,788.2284
Total	**6.0605**	**61.5234**	**42.3824**	**0.0769**	**4.2301**	**2.8783**	**7.1083**	**1.5116**	**2.6613**	**4.1729**	**0.0000**	**6,870.6815**	**6,870.6815**	**1.7417**	**0.0000**	**6,907.2571**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2016	0.5494	1.9795	17.1076	0.0345	1.9521	0.0514	2.0034	0.6929	0.0508	0.7437	0.0000	3,102.5665	3,102.5665	0.7838	0.0000	3,119.0257
2017	0.6340	2.6853	20.8736	0.0425	0.6003	0.0671	0.6674	0.1602	0.0662	0.2264	0.0000	3,768.1082	3,768.1082	0.9579	0.0000	3,788.2246
Total	**1.1833**	**4.6648**	**37.9812**	**0.0769**	**2.5524**	**0.1185**	**2.6708**	**0.8532**	**0.1169**	**0.9701**	**0.0000**	**6,870.6747**	**6,870.6747**	**1.7417**	**0.0000**	**6,907.2503**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**80.47**	**92.42**	**10.38**	**0.00**	**39.66**	**95.88**	**62.43**	**43.56**	**95.61**	**76.75**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

NAS Lemoore Solar PV System - Alternative 1 - Construction - Phase One

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	1/1/2016	4/30/2016	5	86	
2	Grading	Grading	5/1/2016	8/31/2016	5	88	
3	Building Construction	Building Construction	9/1/2016	12/31/2017	5	347	

Acres of Grading (Site Preparation Phase): 1365

Acres of Grading (Grading Phase): 682.5

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Graders	1	8.00	174	0.41
Site Preparation	Tractors/Loaders/Backhoes	10	6.00	97	0.37
Building Construction	Generator Sets	3	6.00	84	0.74
Grading	Rubber Tired Dozers	5	6.00	255	0.40
Grading	Tractors/Loaders/Backhoes	7	6.00	97	0.37
Building Construction	Cranes	2	6.00	226	0.29
Building Construction	Forklifts	3	6.00	89	0.20
Building Construction	Tractors/Loaders/Backhoes	10	6.00	97	0.37
Grading	Graders	3	6.00	174	0.41
Site Preparation	Rubber Tired Dozers	5	6.00	255	0.40
Building Construction	Welders	2	6.00	46	0.45
Site Preparation	Scrapers	3	6.00	361	0.48
Site Preparation	Off-Highway Trucks	10	6.00	400	0.38
Building Construction	Off-Highway Trucks	15	6.00	400	0.38
Grading	Concrete/Industrial Saws	1	6.00	81	0.73

Grading	Off-Highway Trucks	10	6.00	400	0.38
Building Construction	Other Construction Equipment	3	6.00	171	0.42
Building Construction	Rubber Tired Dozers	5	6.00	255	0.40
Building Construction	Scrapers	1	6.00	361	0.48
Building Construction	Trenchers	2	6.00	80	0.50

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	29	350.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Grading	26	350.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	46	350.00	20.00	0.00	16.80	15.00	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Water Exposed Area

Clean Paved Roads

10.1 Vegetation Land Change

Vegetation Type

	Initial/Final	Total CO2	CH4	N2O	CO2e
	Acres	MT			
Cropland	1365 / 0	-8,463.00	0.0000	0.0000	-8,463.00
Total		**-8,463.00**	**0.0000**	**0.0000**	**-8,463.00**

NAS Lemoore Solar PV System - Alt 1 - Decommissioning

San Joaquin Valley Air Basin, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	117.09	1000sqft	2.69	117,090.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	45
Climate Zone	3			**Operational Year**	2016
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - CalEEMod does not have an "agricutural" or "utility" land use type as a default option, so "General Light Industry" was chosen as the closest option. "Unit amount" = amount of proposed "construction" (substation + switching/metering station + switching station + transmission poles; assumed that PV panels are already constructed when placed onsite)

Construction Phase - Demolition phase only. Two months of demolition activity, assumed to be the year 2055 (Model 2, 37 years from construction)

Off-road Equipment - Equipment mix per DOPAA.
"Other general construction equipment" = pile drivers.
"Off-highway trucks" = water trucks.
Vehicle Trips - Assumed all trips are Mon-Fri.

Land Use Change - Land use change from unvegetated solar PV field to agricultural (default = "cropland").

Off-road Equipment - Construction mix per DOPAA.

NAS Lemoore Solar PV System - Alt 1 - Decommissioning

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2055	0.0372	0.1481	0.3598	8.9000e-004	0.0661	3.0600e-003	0.0692	0.0107	3.0600e-003	0.0138	0.0000	82.9158	82.9158	2.9600e-003	0.0000	82.9779
Total	**0.0372**	**0.1481**	**0.3598**	**8.9000e-004**	**0.0661**	**3.0600e-003**	**0.0692**	**0.0107**	**3.0600e-003**	**0.0138**	**0.0000**	**82.9158**	**82.9158**	**2.9600e-003**	**0.0000**	**82.9779**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2055	0.0372	0.1481	0.3598	8.9000e-004	0.0339	3.0600e-003	0.0370	5.8500e-003	3.0600e-003	8.9100e-003	0.0000	82.9157	82.9157	2.9600e-003	0.0000	82.9778
Total	**0.0372**	**0.1481**	**0.3598**	**8.9000e-004**	**0.0339**	**3.0600e-003**	**0.0370**	**5.8500e-003**	**3.0600e-003**	**8.9100e-003**	**0.0000**	**82.9157**	**82.9157**	**2.9600e-003**	**0.0000**	**82.9778**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**48.69**	**0.00**	**46.54**	**45.43**	**0.00**	**35.34**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2055	2/28/2055	5	43	

NAS Lemoore Solar PV System - Alt 1 - Decommissioning

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Scrapers	1	6.00	81	0.73
Demolition	Rubber Tired Dozers	1	6.00	255	0.40
Demolition	Tractors/Loaders/Backhoes	3	6.00	97	0.37
Demolition	Off-Highway Trucks	1	6.00	400	0.38
Demolition	Cranes	1	6.00	226	0.29
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	8	18.00	0.00	533.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Clean Paved Roads

4.0 Vegetation Land Change

Vegetation Type

	Initial/Final	Total CO2	CH4	N2O	CO2e
	Acres	MT			
Cropland	0 / 3130	19,406.0000	0.0000	0.0000	19,406.0000
Total		**19,406.0000**	**0.0000**	**0.0000**	**19,406.0000**

NAS Lemoore Solar PV System - Alt 1 Option - construction - Phase One

San Joaquin Valley Air Basin, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	9.63	1000sqft	0.22	9,625.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	45
Climate Zone	3			**Operational Year**	2016
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - same assumptions as Alternative 1.

Construction Phase - Phase 1 construction estimated to last two years, with 4 months each of site prep and grading, and 16 months of construction.

Off-road Equipment - Equipment mix per DOPAA.

Grading - Assumed that half of the entire site would be prepared during one phase of construction, and 1/4 of the entire site would be graded during one phase of construction.

Trips and VMT - "Vendor" trips include water trucks delivering to the site (and returning).

Construction Off-road Equipment Mitigation - Assume that construction vehicle engines meet the USEPA Tier 4 requirements.

NAS Lemoore Solar PV System - Alt 1 Option - construction - Phase One

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2016	1.8463	19.1546	12.7408	0.0188	2.2634	0.9487	3.2121	1.1332	0.8771	2.0103	0.0000	1,720.5873	1,720.5873	0.4652	0.0000	1,730.3564
2017	1.8772	18.8623	12.7640	0.0204	0.1693	0.9461	1.1154	0.0451	0.8771	0.9222	0.0000	1,831.8142	1,831.8142	0.4904	0.0000	1,842.1117
Total	**3.7235**	**38.0168**	**25.5048**	**0.0392**	**2.4326**	**1.8948**	**4.3274**	**1.1783**	**1.7542**	**2.9325**	**0.0000**	**3,552.4016**	**3,552.4016**	**0.9555**	**0.0000**	**3,572.4681**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2016	0.2666	1.0681	9.8356	0.0188	1.1088	0.0288	1.1377	0.5340	0.0287	0.5626	0.0000	1,720.5855	1,720.5855	0.4652	0.0000	1,730.3545
2017	0.2865	1.3096	10.6362	0.0204	0.1693	0.0319	0.2012	0.0451	0.0317	0.0768	0.0000	1,831.8123	1,831.8123	0.4904	0.0000	1,842.1097
Total	**0.5532**	**2.3777**	**20.4718**	**0.0392**	**1.2781**	**0.0608**	**1.3388**	**0.5791**	**0.0604**	**0.6395**	**0.0000**	**3,552.3977**	**3,552.3977**	**0.9555**	**0.0000**	**3,572.4642**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**85.14**	**93.75**	**19.73**	**0.00**	**47.46**	**96.79**	**69.06**	**50.86**	**96.56**	**78.19**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

NAS Lemoore Solar PV System - Alt 1 Option - construction - Phase One

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	1/1/2016	4/30/2016	5	86	
2	Grading	Grading	5/1/2016	8/30/2016	5	87	
3	Building Construction	Building Construction	9/1/2016	12/31/2017	5	347	

Acres of Grading (Site Preparation Phase): 183

Acres of Grading (Grading Phase): 92

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Graders	1	6.00	174	0.41
Grading	Concrete/Industrial Saws	2	6.00	81	0.73
Site Preparation	Tractors/Loaders/Backhoes	5	6.00	97	0.37
Site Preparation	Rubber Tired Dozers	5	6.00	255	0.40
Grading	Rubber Tired Dozers	5	6.00	255	0.40
Grading	Tractors/Loaders/Backhoes	7	6.00	97	0.37
Building Construction	Cranes	2	6.00	226	0.29
Building Construction	Forklifts	4	6.00	89	0.20
Site Preparation	Scrapers	1	6.00	361	0.48
Site Preparation	Off-Highway Trucks	5	6.00	400	0.38
Site Preparation	Other Construction Equipment	2	6.00	171	0.42
Grading	Graders	4	6.00	174	0.41
Grading	Off-Highway Trucks	5	6.00	400	0.38
Building Construction	Tractors/Loaders/Backhoes	5	6.00	97	0.37
Building Construction	Generator Sets	2	6.00	84	0.74
Building Construction	Off-Highway Trucks	5	6.00	400	0.38

Building Construction	Other Construction Equipment	2	6.00	171	0.42
Building Construction	Rubber Tired Dozers	4	6.00	255	0.40
Building Construction	Scrapers	1	6.00	361	0.48
Building Construction	Trenchers	2	6.00	80	0.50
Building Construction	Welders	2	6.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	19	100.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Grading	23	100.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	29	100.00	10.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Water Exposed Area

Clean Paved Roads

10.1 Vegetation Land Change

Vegetation Type

	Initial/Final	Total CO2	CH4	N2O	CO2e
	Acres	MT			
Cropland	183 / 0	-1,134.60	0.0000	0.0000	-1,134.60
Total		**-1,134.60**	**0.0000**	**0.0000**	**-1,134.60**

NAS Lemoore Solar PV System - Alt 1 OPTION - Decommissioning

San Joaquin Valley Air Basin, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	19.25	1000sqft	0.44	19,250.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	45
Climate Zone	3			**Operational Year**	2016
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - CalEEMod does not have an "agricutural" or "utility" land use type as a default option, so "General Light Industry" was chosen as the closest option. "Unit amount" = amount of proposed "construction" (substation + switching/metering station + switching station + transmission poles; assumed that PV panels are already constructed when placed onsite)
Construction Phase - Demolition phase only. Two months of demolition activity, assumed to be the year 2055 (Model 2, 37 years from construction)

Off-road Equipment - Equipment mix per DOPAA.
"Other general construction equipment" = pile drivers.
"Off-highway trucks" = water trucks.
Vehicle Trips - Assumed all trips are Mon-Fri.

Land Use Change - Land use change from unvegetated solar PV field to agricultural (default = "cropland").

Off-road Equipment - Construction mix per DOPAA.

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2053	0.0361	0.1400	0.3403	8.6000e-004	0.0148	2.9800e-003	0.0178	2.7300e-003	2.9800e-003	5.7200e-003	0.0000	80.0259	80.0259	2.8700e-003	0.0000	80.0862
Total	**0.0361**	**0.1400**	**0.3403**	**8.6000e-004**	**0.0148**	**2.9800e-003**	**0.0178**	**2.7300e-003**	**2.9800e-003**	**5.7200e-003**	**0.0000**	**80.0259**	**80.0259**	**2.8700e-003**	**0.0000**	**80.0862**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2053	0.0361	0.1400	0.3403	8.6000e-004	9.5200e-003	2.9800e-003	0.0125	1.9300e-003	2.9800e-003	4.9100e-003	0.0000	80.0258	80.0258	2.8700e-003	0.0000	80.0861
Total	**0.0361**	**0.1400**	**0.3403**	**8.6000e-004**	**9.5200e-003**	**2.9800e-003**	**0.0125**	**1.9300e-003**	**2.9800e-003**	**4.9100e-003**	**0.0000**	**80.0258**	**80.0258**	**2.8700e-003**	**0.0000**	**80.0861**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**35.72**	**0.00**	**29.72**	**29.30**	**0.00**	**14.16**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2053	2/28/2053	5	43	

NAS Lemoore Solar PV System - Alt 1 OPTION - Decommissioning

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Off-Highway Trucks	1	6.00	400	0.38
Demolition	Rubber Tired Dozers	1	6.00	255	0.40
Demolition	Tractors/Loaders/Backhoes	3	6.00	97	0.37
Demolition	Cranes	1	6.00	226	0.29
Demolition	Concrete/Industrial Saws	1	6.00	81	0.73
Demolition	Scrapers	1	6.00	81	0.73

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	8	20.00	0.00	88.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Clean Paved Roads

NAS Lemoore Solar PV System - Alt 1 OPTION - Decommissioning

10.0 Vegetation

10.1 Vegetation Land Change

Vegetation Type

	Initial/Final	Total CO2	CH4	N2O	CO2e
	Acres	MT			
Cropland	0 / 366	2,269.2000	0.0000	0.0000	2,269.2000
Total		**2,269.2000**	**0.0000**	**0.0000**	**2,269.2000**

NAS Lemoore Solar PV System - Alt 2 - construction - Phase One

San Joaquin Valley Air Basin, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	62.14	1000sqft	1.43	62,144.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	45
Climate Zone	3			**Operational Year**	2016
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - same assumptions as Alternative 1. Phase Two would have the same project characteristics and air emissions.

Land Use - Assumed that half of the site was constructed during one of the two construction phases.

Construction Phase - One construction phase lasts two years, with 4 months of site prep, 4 months of grading, and 16 months of construction.

Off-road Equipment - Equipment mix per DOPAA.

Off-road Equipment - Equipment mix per DOPAA.

Grading - Assume that 1/2 of the site is prepared during one constrution phase, and 1/4 of the site is graded.

Trips and VMT - Vendor trips include water trucks delivering to the site (and returning)

Land Use Change -

Construction Off-road Equipment Mitigation - Assume that combustive engines meet USEPA Tier 4 standards.

Off-road Equipment - Equipment mix per DOPAA.

NAS Lemoore Solar PV System - Alt 2 - construction - Phase One

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2016	2.8318	29.0045	20.1425	0.0345	4.8021	1.3565	6.1586	1.4715	1.2523	2.7237	0.0000	3,103.7814	3,103.7814	0.7905	0.0000	3,120.3829
2017	3.2369	32.5071	22.3146	0.0418	0.5809	1.5305	2.1114	0.1547	1.4171	1.5717	0.0000	3,709.2966	3,709.2966	0.9575	0.0000	3,729.4044
Total	**6.0687**	**61.5116**	**42.4571**	**0.0763**	**5.3830**	**2.8870**	**8.2700**	**1.6262**	**2.6693**	**4.2955**	**0.0000**	**6,813.0781**	**6,813.0781**	**1.7481**	**0.0000**	**6,849.7872**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2016	0.5812	2.2178	17.2961	0.0345	2.4748	0.0747	2.5495	0.7456	0.0722	0.8179	0.0000	3,103.7784	3,103.7784	0.7905	0.0000	3,120.3798
2017	0.7197	3.3623	20.8505	0.0418	0.5809	0.1338	0.7147	0.1547	0.1275	0.2821	0.0000	3,709.2929	3,709.2929	0.9575	0.0000	3,729.4006
Total	**1.3009**	**5.5801**	**38.1466**	**0.0763**	**3.0557**	**0.2085**	**3.2642**	**0.9003**	**0.1997**	**1.1000**	**0.0000**	**6,813.0712**	**6,813.0712**	**1.7481**	**0.0000**	**6,849.7803**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**78.56**	**90.93**	**10.15**	**0.00**	**43.23**	**92.78**	**60.53**	**44.64**	**92.52**	**74.39**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

NAS Lemoore Solar PV System - Alt 2 - construction - Phase One

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	1/1/2016	4/30/2016	5	86	
2	Grading	Grading	5/1/2016	8/30/2016	5	87	
3	Building Construction	Building Construction	9/1/2016	12/31/2017	5	347	

Acres of Grading (Site Preparation Phase): 2,864

Acres of Grading (Grading Phase): 1,432

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Graders	1	6.00	174	0.41
Site Preparation	Rubber Tired Dozers	5	6.00	255	0.40
Site Preparation	Tractors/Loaders/Backhoes	10	6.00	97	0.37
Grading	Graders	3	6.00	174	0.41
Grading	Rubber Tired Dozers	5	6.00	255	0.40
Grading	Tractors/Loaders/Backhoes	7	6.00	97	0.37
Building Construction	Cranes	2	6.00	226	0.29
Building Construction	Forklifts	3	6.00	89	0.20
Building Construction	Generator Sets	3	6.00	84	0.74
Site Preparation	Scrapers	3	6.00	361	0.48
Site Preparation	Off-Highway Trucks	10	6.00	400	0.38
Site Preparation	Other Construction Equipment	2	6.00	171	0.42
Grading	Concrete/Industrial Saws	1	6.00	81	0.73
Building Construction	Tractors/Loaders/Backhoes	10	6.00	97	0.37
Grading	Off-Highway Trucks	10	6.00	400	0.38
Building Construction	Welders	2	6.00	46	0.45

Building Construction	Off-Highway Trucks	15	6.00	400	0.38
Building Construction	Other Construction Equipment	3	6.00	171	0.42
Building Construction	Rubber Tired Dozers	5	6.00	255	0.40
Building Construction	Scrapers	1	6.00	361	0.48
Building Construction	Trenchers	2	6.00	80	0.50

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	31	350.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Grading	26	350.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	46	350.00	20.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Water Exposed Area

Clean Paved Roads

10.1 Vegetation Land Change

Vegetation Type

	Initial/Final	Total CO2	CH4	N2O	CO2e
	Acres	MT			
Cropland	2864 / 0	-17,756.80	0.0000	0.0000	-17,756.80
Total		**-17,756.80**	**0.0000**	**0.0000**	**-17,756.80**

NAS Lemoore Solar PV System - Alt 2 - Decommissioning

San Joaquin Valley Air Basin, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	124.29	1000sqft	2.85	124,290.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	45
Climate Zone	3			**Operational Year**	2016
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - CalEEMod does not have an "agricutural" or "utility" land use type as a default option, so "General Light Industry" was chosen as the closest option. "Unit amount" = amount of proposed "construction" (substation + switching/metering station + switching station + transmission poles; assumed that PV panels are already constructed when placed onsite)

Construction Phase - Demolition phase only. Two months of demolition activity, assumed to be the year 2053 (Model 2, 37 years from construction)

Off-road Equipment - Equipment mix per DOPAA.
"Other general construction equipment" = pile drivers.

Vehicle Trips - Assumed all trips are Mon-Fri.

Land Use Change - Land use change from unvegetated solar PV field to agricultural (default = "cropland").

Off-road Equipment - Construction mix per DOPAA.

NAS Lemoore Solar PV System - Alt 2 - Decommissioning

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2055	0.0411	0.1347	0.3303	1.0100e-003	0.0704	3.1500e-003	0.0735	0.0114	3.1500e-003	0.0146	0.0000	96.8897	96.8897	3.2500e-003	0.0000	96.9581
Total	**0.0411**	**0.1347**	**0.3303**	**1.0100e-003**	**0.0704**	**3.1500e-003**	**0.0735**	**0.0114**	**3.1500e-003**	**0.0146**	**0.0000**	**96.8897**	**96.8897**	**3.2500e-003**	**0.0000**	**96.9581**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2055	0.0411	0.1347	0.3303	1.0100e-003	0.0362	3.1500e-003	0.0394	6.2600e-003	3.1500e-003	9.4100e-003	0.0000	96.8896	96.8896	3.2500e-003	0.0000	96.9579
Total	**0.0411**	**0.1347**	**0.3303**	**1.0100e-003**	**0.0362**	**3.1500e-003**	**0.0394**	**6.2600e-003**	**3.1500e-003**	**9.4100e-003**	**0.0000**	**96.8896**	**96.8896**	**3.2500e-003**	**0.0000**	**96.9579**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**48.55**	**0.00**	**46.47**	**45.23**	**0.00**	**35.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2055	2/28/2055	5	43	

NAS Lemoore Solar PV System - Alt 2 - Decommissioning

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Off-Highway Trucks	1	6.00	400	0.38
Demolition	Rubber Tired Dozers	1	6.00	255	0.40
Demolition	Tractors/Loaders/Backhoes	3	6.00	97	0.37
Demolition	Cranes	1	6.00	226	0.29
Demolition	Concrete/Industrial Saws	1	6.00	81	0.73
Demolition	Scrapers	1	6.00	361	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	8	20.00	0.00	565.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Clean Paved Roads

10.0 Vegetation

10.1 Vegetation Land Change

Vegetation Type

	Initial/Final	Total CO2	CH4	N2O	CO2e
	Acres	MT			
Cropland	0 / 5728	35,513.6000	0.0000	0.0000	35,513.6000
Total		**35,513.6000**	**0.0000**	**0.0000**	**35,513.6000**

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"I'm directing my administration to allow the development of clean energy on enough public land to power 3 million homes. And I'm proud to announce that the Department of Defense, working with us, the world's largest consumer of energy, will make one of the largest commitments to clean energy in history, with the Navy purchasing enough capacity to power a quarter of a million homes a year."

— President Barack Obama

"Changing the way we get and use energy is a priority for the Navy because energy security is critical to our national security. One gigawatt of renewable energy produced from sources like solar, wind, and geothermal could power a city the size of Orlando, Florida, while increasing the security and flexibility of the energy grid."

— Secretary of the Navy Ray Mabus